NASA SP-7011 (13)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

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NASA SP-7011 (13)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during June, 1965

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. **JULY 1965**

INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

a. NASA entries identified by their *STAR* accession numbers (N65-10000 series),
b. AIAA entries identified by their *IAA* accession numbers (A65-10000 series); and
c. LC entries identified by a number in the A65-80000 series.

Many of the abstracts included in this publication have been reproduced from those appearing in *STAR* and *IAA*. This procedure, adopted in the interests of economy and speed, has introduced some variation in size, style, and intensity of type.

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(continued)

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For further details please consult the *Introductions* to *STAR* and *IAA*, respectively.

LC Series

Articles listed are available in the journals in which they appeared. They may be borrowed or consulted in libraries maintaining sets of these journals. In some instances, reprints may be available from the journal offices.

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Copies of *Aerospace Medicine and Biology* (SP-7011) and its supplements can be obtained from NASA (Code ATSS-A), without charge, by NASA offices and contractors, U.S. Government agencies and their contractors, and organizations that are working in direct support of NASA programs.

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TABLE OF CONTENTS

AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography JULY 1965

STAR ENTRIES

N65-21159*# Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART VIII: THE EFFECT ON THE CARDIOVASCULAR TOLERANCE TO PASSIVE TILT

C. Vallbona, D. Cardus, F. B. Vogt, and W. A. Spencer Washington, NASA, Apr. 1965 100 p refs

(Contract NAS9-1461)

(NASA-CR-178) CFSTI: HC $4.00/MF $0.75

This study was carried out to evaluate the effect of short-term (3 days) and long-term (14 days) bedrest on the cardiac tolerance to passive tilt. It showed that there was a deterioration of the subjects' ability to tolerate passive tilt. The deterioration was demonstrated by the negative slopes of the regressional line of blood pressure vs time and the positive slopes of heart rate vs time observed during tilt procedures at the end of the period of bedrest. The intolerance to tilt was more evident after bedrest for 14 days. This study showed also that isometric exercises performed while on bedrest improved the subjects' tolerance to passive tilt, as evidenced in the slopes of blood pressure, which although negative were less steep. Author

N65-21181# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France).

DETERMINATION OF ENVIRONMENTAL AND FOOD-CHAIN RADIOACTIVE CONTAMINATION LEVELS—A GENERAL APPROACH

G. Lacourly Brussels, EURATOM, 1964 7 p refs In FRENCH; ENGLISH summary

(Contract EURATOM-003-63-10 PSAF)

(EUR-2107.f) Available from Belg. Am. Bank and Trust Co., New York, Account No. 22.186: 25 Belg. Fr.

Assuming a steady and uniform contamination leading to a state of equilibrium in soil, this paper describes a general method to determine for a certain population and for each radionuclide having an affinity for the food chain in the critical diet corresponding to a given irradiation dose rate; the corresponding levels of radioactive contamination for each food vector; and the corresponding levels of environmental radioactive contamination. Author

N65-21186# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

ABSORPTION OF RADIOACTIVE WASTE PRODUCTS BY AQUATIC PLANTS [INCORPORACION DE PRODUCTOS DE FISION EN PLANTAS ACUATICAS]

Dan Beninson, Eric Vander Elst, and David Cancio 1964 14 p refs In SPANISH

(Rept.-138)

A laboratory study was made of the absorption of radioactive fission products by various aquatic plants found in the small rivers of Buenos Aires Province, Argentina, in connection with the planned installation of a nuclear reactor in that area. The concentrations of strontium 90, cesium 137, cerium 144, lanthanum 140, ruthenium 106, and zirconium 95 in five plants were measured. Transl. by F.E.R

N65-21202# Technisch Documentatie en Informatie Centrum voor De Krijgsmacht, The Hague (Netherlands).

A REVIEW OF LITERATURE ON MILITARY MEDICINE [LITERATUUROVERZICHT, MILITAIRE GENEESKUNDE]

15 Jan. 1965 21 p refs In DUTCH *Its* 11th Yearly Issue, No. G-119

Abstracts on aerospace medicine, military medicine and hygiene, psychology and psychiatry, and radiation medical physics are presented. Among the subjects covered are (1) systematic absorption of radioactive sodium in fresh and healing traumatic wounds; (2) absorption of radioactive fallout products through normal skin, burns, and open wounds; (3) acute radiation syndrome in domestic animals; (4) electroencephalography in aviation medicine; (5) ozone in high-altitude aircraft cabins; (6) airplane noises; (7) aircraft accidents; (8) combat fatigue; (9) factors associated with psychiatric discharge from the naval service; (10) infection of the urinary tract in young men; (11) influence of army service on the incidence of carriers of Staphylococcus aureus and Streptococcus pyogenes; (12) aging in the Royal Navy; (13) thermal comfort in a small warship; and (14) underwater diving accidents. E.E.B.

N65-21208# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MEDICAL RADIOLOGY Selected Articles

11 Jan. 1965 27 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 9, no. 3, 1964 p 52–66

(FTD-TT-64-7461/1+2; AD-610300)

CONTENTS:

1. STATE OF THE ORGAN OF VISION UNDER THE EFFECT OF γ NEUTRON RADIATION IN DOSAGES CLOSE TO MAXIMUM PERMISSIBLE E. N. L'vovskaya and E. S. Kotova p 1–7 refs (See N65-21209 11-04)

2. DOSAGE CHARACTERISTICS AND PECULIARITIES OF BEING AFFECTED DURING EXPOSURE OF MICE TO γ-IRRADIATION OF A DOSAGE POWER OF 48 kg/min L. B. Koznova p 8–15 refs (See N65-21210 11-04)

3. HISTOCHEMICAL CHANGES IN LEUKOCYTES AT EXPERIMENTAL RADIATION ILLNESS V. A. Almazov, T. L. Rogova, and E. A. Ruppe p 16–24 refs (See N65-21211 11-04)

N65-21209 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

STATE OF THE ORGAN OF VISION UNDER THE EFFECT OF γ NEUTRON RADIATION IN DOSAGES CLOSE TO MAXIMUM PERMISSIBLE

E. N. L'vovskaya and E. S. Kotova *In its* Med. Radiol. 11 Jan. 1965 p 1–7 refs (See N65-21208 11-04)

This report contains the results of dynamic observations conducted by ophthalmologists over a group of workers operating high-power accelerators—synchrocyclotron, accelerating protons, denitrons and alpha particles up to energies ranging from 480 to 840 MeV, and synchrophasotron. A number of examinees worked in conditions of prevagamma radiation not exceeding the permissible levels, while another group worked in conditions of possible n-irradiation. The results of ophthalmological investigations testify to the fact that 6- to 8-year long work under conditions of gamma-neutron radiation in doses approaching the maximally permissible ones does not cause any morbid changes in the organ of vision. Author

N65-21210 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DOSAGE CHARACTERISTICS AND PECULIARITIES OF BEING AFFECTED DURING EXPOSURE OF MICE TO γ-IRRADIATION OF A DOSAGE POWER OF 48 kg/min

L. B. Koznova *In its* Med. Radiol. 11 Jan. 1965 p 8–15 refs (See N65-21208 11-04)

The terminal portion of the dose curve for mice was studied during the use of Co^{60} gamma irradiation of a great dose intensity—48 kR/min. For the first time, by means of visual observation over animals during the process of irradiation, the data of the development of the disease with the life expectation following irradiation were confronted. Emphasis is on the great importance of individual peculiarities of the organism in conditions of the experiment, as action of radiation with a dose intensity of 48 kR/min in comparison with 0.387 to 2 kR/min, this fact broadening the notion on the range of dose intensities during which a reduction of the biological effect becomes manifest. Author

N65-21211 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

HISTOCHEMICAL CHANGES IN LEUKOCYTES AT EXPERIMENTAL RADIATION ILLNESS

V. A. Almazov, T. L. Rogova, and E. A. Ruppe *In its* Med. Radiol. 11 Jan. 1965 p 16–24 refs (See N65-21208 11-04)

The morphological and cytochemical changes of granulocytopoiesis and leukocytes of the peripheral blood in rabbits with experimentally induced radiation sickness were assessed. It was found that in rabbits following irradiation along with cytopenia in the blood and hypoplasia in the bone marrow there occurs a considerable decrease of nucleic acid concentration, oxidation enzymes and glycogen. A diminished content of glycogen in neutrophils is usually preceded by its short-term rise (maximally 6 hours after irradiation). Changes of metabolic activity of neutrophils, along with their reduced content, are decisive factors in the development of septicemia in radiation sickness. Author

N65-21226*# Bunker-Ramo Corp., Canoga Park, Calif.

A BIBLIOGRAPHY OF RUSSIAN SCIENTIFIC AND TECHNOLOGICAL LITERATURE IN MANUAL CONTROL AND ASSOCIATED AREAS

C. M. Bertone Washington, NASA, Apr. 1965 137 p (Contract NASw-869)
(NASA-CR-199) CFSTI: HC $4.00/MF $1.00

This report is a survey of 917 Soviet documents in the areas of manual control systems, human engineering, man in space, and associated areas. The information is reported in bibliographic form with an analysis of the findings and appropriate appendixes. Author

N65-21236# Joint Publications Research Service, Washington, D. C.

BIOLOGY AND ITS ALLIES

25 Mar. 1965 82 p ref Transl. into ENGLISH of the publ. "Biologiya i Yeye Soyuzniki" Moscow, "Znaniye" Publishing House, 1964 p 1–80
(JPRS-29292; TT-65-30591) CFSTI: $3.00

CONTENTS:

1. CONTEMPORARY BIOCHEMISTRY AND ITS IMMEDIATE TASKS N. M. Sisakyan p 2–17 refs
2. BIOCHEMISTRY OF RESPIRATION AND HEALTH S. Ye. Severin p 17–33
3. PHYSIOLOGY TOWARD NEW FRONTIERS V. V. Parin p 33–49
4. IN THE WORLD OF INAUDIBLE SOUNDS (ULTRASONICS IN BIOPHYSICS) I. Ye. El'piner p 50–69
5. THE PRESENT AND FUTURE OF RADIOBIOLOGY A. M. Kuzin p 69–79

N65-21237# Joint Publications Research Service, Washington, D. C.

CHANGES IN THE CONCENTRATION OF SEROTONIN IN THE BLOOD OF ANIMALS EXPOSED TO EFFECTS OF IONIZING RADIATION AND DYNAMIC FACTORS OF SPACE FLIGHT

V. V. Parin, V. V. Antipov, M. O. Raushenbakh, P. P. Saksonov, V. S. Shashkov et al 5 Apr. 1965 14 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), No. 1, Jan.–Feb. 1965 p 3–9 Presented at the 6th Intern. and 12th European Congr. of Aviation and Space Med., Rome, 1–5 Oct. 1963
(JPRS-29434; TT-65-30653) CFSTI: $1.00

In the animals studied (monkeys, dogs, guinea pigs, rats, and mice) two types of changes of the concentration of serotonine in the blood were observed during acute radiation sickness, after common γ-radiation of Co^{60}. In dogs, monkeys, and guinea pigs the disruption in the content of serotonin in the blood was of a sharply expressed nature and depended upon the seriousness of the radiation sickness, while in rats and mice the reduction in the concentration of serotonin was more weakly expressed and did not depend upon the seriousness of radiation damage. Author

N65-21241# Argonne National Lab., Ill.

HEALTH DIVISION GAMMA-RAY SPECTROSCOPY GROUP Semiannual Report, Jan.–Jun. 1964

Asher J. Finkel Jan. 1965 87 p refs
(Contract W-31-109-ENG-38)
(ANL-6839) CFSTI: $3.00

The results of several studies on human gamma-ray spectroscopy are discussed for *Long-Term Effects of Radium Deposition in Man*—current or terminal radium deposition in man; *Multiple-Crystal-Position Technique for Whole-Body Measurements*—procedure to reconstruct the gamma-ray profile along the long axis of the body without the use of a collimated crystal; *Distribution of Radium in Humans*—whole-body radiation measurements and skeletal X-rays for 280 patients, and detailed tables from measurements of 42 radium patients by the 7-crystal position technique; *Radium Retention in Mice after Single Intravenous Injection*—correspondence of the radium retention patterns of mice to that of man; *Some Problems of Accurate Measurement of Potassium in Man*—evaluation of the accuracy of three whole-body counting techniques; and Cs^{137} *Trends in Humans from 1955 to 1964*—variations of Cs^{137} in an individual reflect his dietary habits rather than the general fallout level. G.G.

N65-21258# Bunker-Ramo Corp., Silver Spring, Md.
HUMAN ENGINEERING: PILOT FACTORS PROGRAM Final Summary Report, 1 Jan. 1963–30 Sep. 1964
W. F. Swartz Sep. 1964 52 p
(Contract AF 33(616)-7752)
(Rept.-1-64; AD-455013)

The compatibility of manual flying with an automatic flight control system approach using Force Wheel Steering as the connecting link was studied by means of oscillograph recordings and a standard display panel. Deterioration of the standard panel at 200 ft due to lack of information led to an additional study to determine the pilot's ability to fly through a 50-ft approach to gain additional information for the panel. The demonstrated reduction of pilot work load with force wheel steering suggests that the copilot be provided with a force wheel capability to establish the highest possible level of unburdening by means of integration of forced wheel and crew duties. The observed data were used in a rough draft of pilot preference as a function of gain, deadband, and bank angle. The consulting and planning activities of the support group for the Pilot Factors Program are also presented. G.G.

N65-21309*# Republic Aviation Corp., Farmingdale, N. Y. Space Environment and Life Sciences Lab.
STUDY OF THE NORMAL FECAL BACTERIAL FLORA OF MAN Quarterly Progress Report, Oct. 1–Dec. 31, 1964
Lorraine S. Gall 7 Jan. 1965 25 p refs
(Contract NASw-738)
(NASA-CR-57812; RAC-931-6) CFSTI: HC $1.00/MF $0.50

Primary culturing and isolation of the predominating fecal flora of man in 20 subjects, and physiological studies on 27 FA-type cultures, including an additional type labeled FA-18, were conducted. Anaerobic growth was found to exceed the aerobic count by 1:1000 to 1:10000 times. The number of times that strict anaerobes vs. facultative anaerobes occurred in the top three dilutions of the fecal material indicates that anaerobes are in the vast majority. To gain insight into the effects of man's intestinal bacteria on his nutrition, metabolic studies based on the fermentation of nitrogenous compounds which may be available for bacterial metabolism in the human digestive tract were made. FA-type cultures were tested for ability to produce indole as a byproduct of growth, for enzymatic decarboxylation of alpha amino acids to amines and carbon dioxide, and screened for the degree of deamination of casein hydrolyzate. Aerobic studies indicate that the vast majority of the gram negative rods isolated are *Escherichia coli*, many of which fall into various serotypes. L.S.

N65-21324*# Mayo Clinic, Rochester, Minn.
VIDEOROENTGENOGRAPHIC STUDY OF THE HEART AND LUNGS DURING EXPOSURE TO FORWARD ACCELERATION Semiannual Status Report
Earl H. Wood 1 Apr. 1965 23 p refs
(Grant NsG-327)
(NASA-CR-57958) CFSTI: HC $1.00/MF $0.50

A variety of roentgen videodensitometer studies of the heart and lungs during forward acceleration were made and the results are summarized. The only pathophysiologic effects of forward acceleration that pose a serious threat to the functional integrity of astronauts during the launch and reentry phases arise from the large hydrostatic pressure imbalances which develop in the lungs and thorax. It was concluded that the cardiopulmonary effects of acceleration carry the greatest likelihood of mission limiting or mission failure through the threat to the welfare of the astronaut. Appendixes contain the following studies: *Pleural Pressures in Dogs During Transverse Acceleration; Effect of Forward, Backward, Right Lateral and Left Lateral Acceleration on Blood Oxygen Saturation in Dogs;* and *Pericardial Pressures in Different Body Positions During Transverse Acceleration in Dogs Studied Without Thoracotomy.* G.G.

N65-21338*# Naval School of Aviation Medicine, Pensacola, Fla.
THE INNER EAR ANATOMY OF THE SQUIRREL MONKEY. THE STUDY OF HORIZONTAL SERIAL SECTIONS
Makoto Igarashi 16 Jul. 1964 90 p refs Joint report with NASA *Its* Monograph No. 8
(NASA Order R-93)
(NASA-CR-57931) CFSTI: HC $3.00/MF $0.75

This monograph includes a series of microphotographs of the horizontal serial sections under low magnification (about 20 x). This series is the right ear viewing from the superior. A branched arrow, which appears at the corner of each picture, indicates the plane parallel to the sagittal (occipito-frontal) line. The arrow is pointing toward the front, and the extension is toward the lateral. The interval between each picture is 200μ. Higher magnification views of some important structures from this series, from other animals, and from some humans are shown. Several bilateral temporal bone microphotographs (horizontal sections) of squirrel monkeys and cats are included. The modiolar angle and the posterior semicircular canal plane are clearly demonstrated. Author

N65-21340*# California Univ., Los Angeles. Human Communication Lab.
THE DETECTION OF MARKOVIAN SEQUENCES OF SIGNALS Technical Report No. 23
Morton P. Friedman and Edward C. Carterette 15 Jul. 1964 23 p refs
(Grants NsG-237-62; PHS-MH-07809; Contract Nonr-233(58))
(NASA-CR-57928) CFSTI: HC $1.00/MF $0.50

The influence of constrained stimulus sequences on detection was studied in a two-alternative temporal forced-choice task with feedback. Three observers listened to a weak pure tone embedded in noise whose probabilities of occurrence

and repetition in an interval were governed by a first-order Markov process. Each observer listened to examples of each of nine different Markov chains. Results were: (1) A single function relating detections to false alarms fitted individual sets of data well, in agreement with the theory of signal detectability, except that detection was higher for more extreme repetition probabilities. (2) Responses depended strongly on he previous stimulus with the dependence being peculiar to a given chain. (3) Detection probabilities increased during runs of signals in the same interval, yet probability of detection on the first trial of a run in a given interval did not depend on the length of the preceding run in the other interval. Author

N65-21363# Joint Publications Research Service, Washington, D. C.

NYSTAGMOGRAPHIC ANALYSIS OF THE FAST COMPONENT OF VESTIBULAR NYSTAGMUS CAUSED BY RADIAL ACCELERATION

M. M. Levashov 13 Apr. 1965 16 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 50, no. 12, Dec. 1964 p 1424–1433

(JPRS-29571; TT-65-30728) CFSTI: $1.00

A detailed nystagmographic analysis of the slow and rapid movements of rabbit eyes during radial acceleration is discussed, with emphasis on the initial part of the reaction when the greatest changes in the ampullar apparatus are present. The animals were rotated in the horizontal plane and the nystagmus was recorded by direct photography of the eyes through a crack on a moving film. The rabbit's eyes were anesthetized with dicaine solution to prevent blinking. It was found that the velocity of the fast component of the vestibular nystagmus changes in the course of the reaction both in the direction of increase and decrease, with most pronounced changes observed at the beginning of rotational and postrotational nystagmus. The changes often fail to coincide with directional changes in velocity of the slow component. The vestibular nystagmus changes follow a pattern for 2000 milliseconds past rotation, and a relationship between the intensity of velocity and the vestibular apparatus is assumed. G.G.

N65-21390*# Republic Aviation Corp., Farmingdale, N.Y. Space Environment and Life Sciences Lab.

STUDY OF THE NORMAL FECAL BACTERIAL FLORA OF MAN Quarterly Progress Report, Jan. 1–Mar. 31, 1965

Lorraine S. Gall 31 Mar. 1965 24 p

(Contract NASw-738)

(NASA-CR-62108; RAC-931-7) CFSTI: HC $1.00/MF $0.50

Primary isolation of predominating fecal anaerobes in nine subjects was completed. Tables were prepared showing the distribution of the organisms, the distribution of the various types of cultures between the first and second groups of subjects, the types of cultures grouped according to frequency of occurrence, the aerobic plate count in millions, the height of the anaerobic plate count by tubes, and the number of times strict anaerobes vs. facultative anaerobes occurred. The ability of this type of culture to produce or use certain in vitamins was tested with respect to vitamin B_{12}, riboflavin, niacin, pantothenic acid, and folic acid. On the basis of other screening tests (glucose metabolism, decarboxylation, and deamination activities), the organisms were classified into two main groups—carbohydrate fermentors and protein metabolizers. These data will be used in determining the function of each organism within the human body. L.S.

N65-21398# Mayo Clinic, Rochester, Minn.

USE OF DICHROMATIC EARPIECE DENSITOMETRY FOR DETERMINATION OF CARDIAC OUTPUT Final Report, 1 Oct. 1963–1 Nov. 1964

John H. Reed, Jr. and Earl H. Wood Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 18 p refs Presented to the Am. Physiol. Soc., Providence, 5 Sep. 1964

(Grants NsG-327; NIH-H-3532; Contract AF 33(657)-8899)

(AMRL-TR-64-134; AD-613335)

In situations which forbid direct arterial sampling such as space flight, estimation of cardiac output by ear densitometer may be justifiable. Compensation for changes in blood content and saturation recommend dichromatic densitometry. Simultaneous dilution curves following injection of 5 mg indocyanine green into the superior vena cava of nine healthy subjects and five patients during rest and exercise were recorded by a dichromatic ear densitometer, a conventional ear oximeter, and a cuvette coupled to the radial artery. The dichromatic earpiece densitometer showed a linear relationship between its calibration factor for dye and the relative blood content of the ear determined by inflating its pressure capsule to 250 mm of mercury. It is concluded that dichromatic earpiece densitometry may be useful in situations where more reliable methods are impossible. By use of a previously calibrated earpiece, it appears possible to obtain values for cardiac output without the necessity of withdrawal and spectrophotometric analysis of blood samples for calibration. Author

N65-21399# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Multienvironment Div.

A RESTRAINT SYSTEM FOR APPLICATION IN R_Z AND $-G_X$ ACCELERATION ENVIRONMENTS WITH EMPHASIS UPON KNEE AND LOWER LEG RESTRAINTS Final Report, Dec. 1963–Feb. 1964

Robert E. Van Patten Dec. 1964 11 p

(AMRL-TR-64-144; AD-612957)

This report describes the development of a lower leg restraint system design suitable for use in yaw (R_Z) and transverse P-A G ($-G_X$) acceleration environments. The design is based upon the principle of avoiding restraining force concentrations along the anterior crest of the tibia and has been worn with comfort for periods of up to three minutes with the legs in a 9.8 G field. Author

N65-21422*# North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.

INVESTIGATION OF POTENTIAL ANTI-RADIATION AND ANTI-NEOPLASTIC COMPOUNDS RELATED TO PLANT GROWTH REGULATORS Second Quarterly Progress Report, 1 Oct. 1964–1 Jan. 1965

Robert D. Schultz and David Norman 1 Jan. 1965 19 p refs Sponsored by NASA

(Contract PH 43-64-865)

(NASA-CR-62133; SID-65-79-2) CFSTI: HC $1.00/MF $0.50

Investigations of cytotoxic effects of plant growth regulators on ascites tumors, in vitro, included (1) possible interference with an oncogenic virus–host cell interaction; (2) synergism or inhibition by indolyl compounds; (3) cytocidal activity of radiation-protective auxin analogs and related compounds; (4) morphological changes in carcinoma cells; and (5) effects of IABu(t) on the respiration of free Ehrlich ascites cells. Study of cytotoxic effects of plant auxin analogs on ascites tumors, in vivo, included the (1) effect of injectior vehicle on tumorcidal activity; (2) acute cytocidal effect

against P815 mast cell ascites tumor; and (3) in vivo experimentation. New data have also been derived on the radiation-protective effects of auxin analogs and in two-dimensional chromatography of indolyl compounds that are endogenous to some ascites tumors. E.E.B.

N65-21424*# Library of Congress, Washington, D. C. Space and Technology Div.
AEROSPACE MEDICINE AND BIOLOGY, AN ANNOTATED BIBLIOGRAPHY. VOLUME XI: 1962–1963 LITERATURE
Roman Kenk, ed. 1965 501 p refs Sponsored by NASA
(NASA-CR-62127) CFSTI: HC $5.00/MF $2.50

A selection of 2335 journal articles and other pertinent references are compiled in abstracted form. The bibliography is divided into the following sections: *General Aspects; Biology; General Physiology; Neuro and Sensory Physiology; Psychology and Psychiatry; Biological, Physiological, and Psychological Effects of Environmental Factors and Stresses; Personnel; Medical Problems and Pharmacology; Toxicology; Safety, Survival, and Rescue;* and *Man–Machine Integration and Life Support Systems*. Included are author, corporate, and subject indexes. G.G.

N65-21442# Atomic Energy Commission, Washington, D. C. Div. of Technical Information
RADIOACTIVE FALLOUT: A BIBLIOGRAPHY OF THE WORLD'S LITERATURE Supplement 2
William E. Bost and Hugh E. Voress, comp. Mar. 1965 267 p refs
(TID-3086, Suppl. 2) CFSTI: $6.00

Included are 1953 references to unclassified reports, journal articles, and other literature on the radioactive materials produced by nuclear explosions. The interactions of these materials with the biosphere and with its inhabiting organisms are the primary concern, but an attempt has also been made to cover contiguous areas. A subject arrangement of the references is employed, and author and report availability indexes are provided. This supplement covers the period from February 1962 through December 1963. Author

N65-21449# Pisa Univ. (Italy). Inst. of Physiology
COMPARATIVE NEUROPHYSIOLOGY OF VISION Final Report, 15 Sep. 1963–14 Sep. 1964
Giuseppe Moruzzi 15 Sep. 1964 16 p refs
(Grant AF-EOAR-63-9)
(AFOSR-65-0039; AD-455012)

The results are summarized for research on the following: (1) behavior of retinal units during dark adaptation; (2) study of biological noise in the retina; (3) transfer properties of the cat's eye; (4) effect of darkness on the onset of sleep in birds; (5) electroretinography in *Lycosa tarentula*; (6) intracellular recording from reticular neurons; and (7) relationships between midline thalamic nuclei and reticular formation. Author

N65-21473*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
THE EVOLUTION OF A SPACE FEEDING CONCEPT FOR PROJECT GEMINI
Robert A. Nanz, Edward L. Michel, and Paul A. Lachance [1964] 16 p refs Presented to the Inst. of Food Technologists, Washington, D.C., 24–28 May 1964
(NASA-TM-X-51697) CFSTI: HC $1.00/MF $0.50

The evolution of the feeding concepts used in Project Mercury missions, and envisioned for Project Gemini and early Apollo missions is described. Two distinct feeder and dispenser designs were developed almost simultaneously and then merged to provide the best of each. The evolution of the feeder design is illustrated. The principal changes were affected by whether or not the food was molded, and by water rehydration interface problems. An early concept used a solid plastic ring-type orifice, both as a water nozzle interface and as a feeding port. A similar early concept had a dual-purpose, but nonrigid, port. During the last Mercury flight, leakage at the feeder–water dispenser interface occurred during the in-flight evaluation and led to the present two-port concept. One port accepts the water probe for rehydration, and a separate port is provided at the opposite end for feeding. E.E.B.

N65-21477*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
STUDIES ON THE LOCALIZATION AND MECHANISM OF ALKALINE METAL ACTIVATION OF PROTEIN SYNTHESIS
Henry A. Leon and Henry L. Speer [1964] 27 p refs Submitted for Publication
(NASA-TM-X-51788) CFSTI: HC $2.00/MF $0.50

The in vitro activation of rat liver protein-synthesizing systems by alkaline metals and ammonium ions occurs in a bimodal fashion with respect to the concentration. Detailed studies with K^+ show that the relative magnitudes of the two optima change when different energy regenerating systems are employed. The bimodal response of the incorporation process per se, which is the final expression of a multiple component dependency on K^+, for the most part involves steps concerned with the interaction between amino acyl S-RNA and the ribosomal complex. When this latter reaction is studied using microsomes, four to six individual peaks of K^+ stimulation are discernible. With *E. coli* ribosomes, multiple K^+ optima are seen for amino-acid incorporating systems which employ either native or synthetic messenger RNA. Indications are that these multiple optima are an expression of a ribosomal property which is altered by prior activity. The findings are discussed in the light of the presently expressed concepts concerning the structure of the functioning polysome. Author

N65-21478*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE ORIGIN OF LIFE IN THE UNIVERSE
Cyril Ponnamperuma [1964] 38 p Presented at the Space Sci. Education Conf., Los Angeles, 4 Jun. 1964 Submitted for Publication
(NASA-TM-X-51753) CFSTI: HC $2.00/MF $0.50

Classical and modern theories on the origin of the universe and of life are reviewed. Recent experiments and planned projected space experiments in exobiology and chemical evolution are discussed. E.P.V.

N65-21479*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTER-SENSORY JUDGMENTS OF SIGNAL DURATION
Trieve A. Tanner, Jr., R. Mark Patton, and R. C. Atkinson (Stanford Univ.) [1964] 11 p Presented at the Aerospace Med. Assoc. Meeting, Miami, Fla., 11–14 May 1964
(NASA-TM-X-51729) CFSTI: HC $1.00/MF $0.50

Visual and auditory signals were presented to 12 male subjects, free from gross impairment, for both inter- and intramodality comparisons of duration. Three base durations were investigated: t = 0.5, 1.0, and 1.5 sec; the difference increment Δt, was held constant at 0.1 sec, with only one base duration presented during a single session. Each signal consisted of a light or a tone, so that on any given trial the subject was presented either two lights, two tones, a tone followed by a light, or a light followed by a tone. A trial began with the onset of low intensity background noise and ended with its offset. Discrimination of signal duration was most accurate when two auditory signals were compared. Next in accuracy seem to have been judgments comparing the duration of two visual signals. Within the range of durations investigated, the tendency to judge the visual signal as longer than the auditory seems to increase for shorter base duration. Where signals of the same sensory modality are compared, the probability of the first signal being chosen is a function of $\Delta t/t$. E.P.V.

N65-21538# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology

X-IRRADIATION PROTECTION STUDIES. III: TOTAL DOSE AND RATE EFFECTS IN X-RAY PROTECTION STUDIES

James L. Leitch Mar. 1965 16 p refs

(Contract AT(04-1)-GEN-12)

(UCLA-12-547)

A new procedure for the evaluation of radiation protection studies based on mean cage survival time data is outlined. A drug combination of 10-μM AET plus 1-μM 5-HT administered i.p. 20 to 30 minutes prior to delivery of from 460- to 900-R whole-body X-irradiation affords protection if continuous exposure time does not exceed 45 to 60 minutes. This exposure time approximates the observed duration of this drug combination in mice. Author

N65-21540# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

RADIOBIOLOGY (SELECTED CHAPTERS)

David Emmanvilovich Grozdenskiy 23 Jan. 1963 120 p ref Transl. into ENGLISH from the book "Radiobiologiya, Biologicheskoye Deystviye Ioniziruyushchikh Izlucheniy (Moscow), Gos. Izd. Lit. v Obl. At. Nauki i Tekhn., 1961 p 20-120

(FTD-TT-62-355/1+2+4; AD-295807)

Radiation effects on whole organisms, biological cells, and on the chemical constituents of cells are described. The radiation of water and of biogenous substances in vitro is discussed. Also included are the role of oxygen in irradiation, and radiation effects on cell structure, cell division, embryo, and fetus. The radiosensitivity of animals and plants, and radiation-induced metabolic disorders, cancer, and leukemia, are included. Chemical protection against radiation, and problems of treating radiation sickness are discussed. L.S.

N65-21570# Joint Publications Research Service, Washington, D. C.

THE USE OF FREE PHAGE AND THE SYSTEM PHAGE-BACTERIUM IN STUDYING THE PRIMARY BIOLOGICAL EFFECT OF IONIZING RADIATION

G. Ye. Fradkin 15 Apr. 1965 14 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 1, Jan.-Feb. 1965 p 44-52

(JPRS-29606; TT-65-30745) CFSTI: $1.00

Experimental analysis of comparative resistance to radiation of the genetic code programing and controlling systems of DNA of moderate phage lambda was investigated. The functional value of the programing apparatus was measured by the capacity of the radiated viral fragments to reproduce. The quantitative yield of virulent mutants from moderate phage lambda was incapable of completing the function of blockage of structural information. The quantity of virulent mutants was checked by contact of a radiated population of moderate phage with a lyzogenized culture of *E. coli* K-12 (lambda). For the appearance of virulent mutants of moderate viral particles, the increasing titer of phage (PHPh) was used as a peculiar biological reinforcement, revealing detectable mutation variations by a slight increase. Lyzogenized cells incapable of inducing prophage into phage with ionizing radiation were separated. Streptomycin-resistant variants of an indicator culture of *E. coli* and lyzogenized noninduced pure culture of *E. coli* K-12 was used to exclude the masking of end plates by extraneous microflora of the rise in phage titer with the methods of radiation genetics. It was concluded that the controlling apparatus of phage lambda DNA is more radiosensitive than the programing apparatus. R.W.H.

N65-21572# Joint Publications Research Service, Washington, D. C.

SETTING UP OF STANDARDS FOR MAXIMUM PERMISSIBLE CONCENTRATIONS OF INDUSTRIAL DUST

S. V. Miller 21 Apr. 1965 8 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), v. 9, no. 1, Jan. 1965 p 3-6

(JPRS-29693; TT-65-30790) CFSTI: $1.00

The problem of standardization of maximum permissible concentrations of industrial dust is reviewed. The present standard of 1 and 2 milligrams per cubic meter for strongly fibrogenic dust and 10 milligrams per cubic meter for dusts that are not very irritating is not questioned. However, the intermediate standard of 5 milligrams per cubic meter instead of a proposed 4, 6, and 8 milligrams per cubic meter is discussed in detail. Also the terms toxic, very toxic, nontoxic, and inert as applied to dust are considered. E.E.B.

N65-21573# Joint Publications Research Service, Washington, D. C.

CLINICAL SYNDROMES ARISING UNDER THE EFFECT OF VARIOUS RADIO FREQUENCY BANDS

E. A. Drogichina and M. N. Sadchikova 21 Apr. 1965 10 p Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniye (Moscow), v. 9, no. 1, Jan. 1965 p 17-21

(JPRS-29694; TT-65-30791) CFSTI: $1.00

The development of various stages of the diseased state produced by the action of radiofrequencies, and the differentiation between individual syndromes were investigated. The asthenic syndrome apparently develops because of the exhausting action of the radio waves on the higher divisions of the central nervous system. Observed are an increase in fatigue, headaches, sleepiness during work, an inclination toward bradycardia and arterial hypotonia, and weak pronounced symptoms of vegetative hyporeactivity. Clinical observations detected neurotic reactions and asthenization phenomena of the cerebrasthenia type. A number of patients exhibited a trophic disturbance and a decrease in sexual potency. The asthenovegetative syndrome which characterizes the second stage of the pathological condition regresses slowly and may lead to a temporary decrease in working capacity. An objective investigation disclosed trembling of the fingers of extended hands, stimulation of tendon reflexes, a pronounced dermography, hyperhydrosis, and a decrease in sensitivity to pain (the threshold according to the algesimeter was 0.5 mm). Examination of the blood showed a tendency toward leukopenia (from 3600 to 4900 leukocytes). R.W.H.

N65-21711# Joint Publications Research Service, Washington, D. C.

MAN IN A STATE OF WEIGHTLESSNESS (PSYCHOLOGICAL EXPERIMENTS)

A. Kitayev-smyk 23 Apr. 1965 16 p Transl. into ENGLISH from Nauka i Zhizn' (Moscow), no. 9, Sep. 1964 p 16-21 (JPRS-29743; TT-65-30814) CFSTI: $1.00

The conditions under which weightlessness is experienced; the sensations of the phenomenon; reactions of individuals to this experience; and the physiology of the human are discussed. Experiments are used to show that under conditions of weightlessness the ability to work becomes less, the quality of the work decreases, and the time required to accomplish tasks increases. Also, the individual tends to overestimate his speed and the quality of the work done. Further, differences between individual experiences are examined. Knowledge of these peculiarities and deficiencies is applied in astronaut selection and training. E.E.B.

N65-21724*# Naval School of Aviation Medicine, Pensacola, Fla.

RADIATION EXPOSURE IN SOLAR PARTICLE BEAMS BEHIND VERY LOW SHIELDING

Hermann J. Schaefer 19 Feb. 1965 14 p refs Joint report with NASA

(NASA Order R-75)

(NASA-CR-62198; NSAM-914) CFSTI: HC $1.00/MF $0.50

Outside the vehicle the astronaut is protected from radiation merely by his space suit with a shielding equivalent of about 0.1 g/cm^2. Evaluations based on a spectral model for a solar particle beam suggested by Weir and Brown show that the skin dose for such low shielding is due predominantly to the alpha component of the flare beam. Sixty-five percent of this alpha skin dose is produced at a high LET corresponding to a QF of 6 and an RBE of 3. The alpha dose itself, as well as QF and RBE, drops much more steeply with increasing depth in tissue than the proton dose. Analysis of the thickness distribution of a space suit due to the structural inhomogeneities shows that substituting the mean for the actual distribution introduces an error of only 2% in the surface tissue dose behind the suit materials. The findings indicate that a correct assessment of exposure in solar particle beams behind low shielding requires LET sensors in addition to instrumentation for measuring total rad doses. Author

N65-21725*# National Aeronautics and Space Administration, Washington, D. C.

ESSAY ON THE HISTORY OF AVIATION MEDICINE

A. A. Sergeyev Apr. 1965 421 p refs Transl. into ENGLISH of the publ. "Ocherki po Istorii Aviatsionnoy Meditsiny" Moscow, USSR Acad. of Sci. Publishing House, 1962

(NASA-TT-F-176) CFSTI: HC $7.25/MF $2.25

CONTENTS:

1. BEFORE THE DEVELOPMENT OF AVIATION MEDICINE p 1-25 refs (See N65-21726 11-04)

2. THE DEVELOPMENT OF AVIATION MEDICINE—THE FIRST PERIOD p 26-40 refs (See N65-21727 11-04)

3. AVIATION MEDICINE OUTSIDE RUSSIA DURING AND IMMEDIATELY AFTER THE FIRST WORLD WAR (1914-1920) p 41-54 refs (See N65-21728 11-04)

4. ORIGINS OF SOVIET AVIATION MEDICINE p 55-61 refs (See N65-21729 11-04)

5. EMERGENCE OF SOVIET MEDICINE p 62-75 (See N65-21730 11-04)

6. AVIATION MEDICINE OUTSIDE RUSSIA 1920-1930 p 76-92 refs (See N65-21731 11-04)

7. THE GOLDEN AGE OF SOVIET AVIATION MEDICINE 1930-1940 p 93-112 (See N65-21732 11-04)

8. PHYSIOLOGIC CONDITIONS FOR STRATOSPHERE BALLOON FLIGHTS p 113-127

9. THE CENTRAL SCIENTIFIC PSYCHOPHYSIOLOGICAL LABORATORY FOR THE STUDY OF CIVIL AIRCREW EFFICIENCY p 127-139 refs

10. THE INSTITUTE OF AVIATION MEDICINE p 139-158 refs

11. THE KIROV MILITARY MEDICAL ACADEMY p 159-196 refs

12. THE ALL-UNION INSTITUTE OF EXPERIMENTAL MEDICINE (AIEM) p 196-205 refs

13. CONTRIBUTION OF SOVIET MOUNTAINEERING PHYSIOLOGISTS TO AVIATION MEDICINE p 206-224 refs (See N65-21733 11-04)

14. AVIATION MEDICINE IN THE USSR DURING THE SECOND WORLD WAR p 225-253 refs (See N65-21734 11-04)

15. A BIBLIOGRAPHY OF WORKS IN RUSSIAN ON AVIATION MEDICINE UP TO 1950 p 254-398 refs (See N65-21735 11-04)

N65-21726* National Aeronautics and Space Administration, Washington, D. C.

BEFORE THE DEVELOPMENT OF AVIATION MEDICINE

In its Essay on the Hist. of Aviation Med. Apr. 1965 p 1-25 refs (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

An historical review of studies by Russian scientists on mountain sickness, and the consumption of rarefied air and its effect on the respiratory and circulatory systems of the human organism is presented. These research investigations have contributed immensely to Russian aviation medicine. R.W.H.

N65-21727* National Aeronautics and Space Administration, Washington, D. C.

THE DEVELOPMENT OF AVIATION MEDICINE—THE FIRST PERIOD

In its Essay on the Hist. of Aviation Med. Apr. 1965 p 26-40 refs (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

Historically, aviation medicine began to develop in Russia in 1910. In Russia and France, publications, regulations, and instructions were printed before the First World War or the selection, physiology and hygiene of aviators. The foundations of Russian aviation medicine were established when the flying club (All-Russian Flying Club, organized on 25 October 1908) passed its resolution on the medical examination of pilots in 1909. A resolution on the supply of instruments and apparatus for studying the effect of flights on the human organism was sent to the officers' flying school and delegated the preparation of a list of equipment to the commission that had compiled the list of diseases and physical defects that debarred individuals from entering aviation units. During the First World War there was a decline of aviation medicine in Russia and only three works appeared dealing with ballooning and not aviation. The revival did not come until the first 10 years after the resolution. Exceptional development occurred in the 1930's. R.W.H.

N65-21728* National Aeronautics and Space Administration, Washington, D. C.

AVIATION MEDICINE OUTSIDE RUSSIA DURING AND IMMEDIATELY AFTER THE FIRST WORLD WAR (1914-1920)

In its Essay on the Hist. of Aviation Med. Apr. 1965 p 41–54 refs (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

Progress made outside of Russia in aviation medicine during and after the First World War is discussed. The development of aviation medicine was directly related to progress in aviation technology, which aroused public opinion and drew the attention of doctors to the new problems. Despite the attempts of individual medical enthusiasts to devote their energies to the study of the occupational features of flying, French aviation medicine was in a poor state at the beginning of the First World War. The physiological trend in French aviation medicine promoted a number of articles devoted to circulatory reactions. Seven orthocardiographic studies were published demonstrating that enlargement of the heart was bound to occur in pilots who ascended to high altitudes without oxygen. Main trends in aviation medicine (psychophysiological, clinical, and physiological) were outlined and consolidated in France at the end of the First World War. Italy, Germany, and the United States also made contributions to aviation medicine around the time of the First World War. R.W.H.

N65-21729* National Aeronautics and Space Administration, Washington, D. C.

ORIGINS OF SOVIET AVIATION MEDICINE

In its Essay on the Hist. of Aviation Med. Apr. 1965 p 55–61 refs (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

During the First World War the doctors attached to Soviet aviation units did not conduct any research and there was no report of their investigations. Because the blockade and the Civil War made foreign literature unavailable to Russian doctors, the first Soviet aviation doctor, S. E. Mints, came forward unrecognized. Mints collected literature on aviation medicine, particularly German literature of the latter years of the war. In the initial stages of its development Soviet aviation medicine adopted an incorrect approach to the solution of the difficult questions of selection. In adopting the tests current in bourgeois psychology without any criticism and in relying on purely arithmetical calculations of errors and mistakes by the person being tested, Soviet aviation medicine fell into a psychotechnical approach from which it did not escape until the late 1920's. Although Mints' work was confined to introducing foreign methods and supporting psychotechnical research, he was the first Soviet aviation doctor to indicate the need for medical study of the work and conditions of pilots. R.W.H.

N65-21730* National Aeronautics and Space Administration, Washington, D. C.

EMERGENCE OF SOVIET AVIATION MEDICINE

In its Essay on the Hist. of Aviation Med. Apr. 1965 p 62–75 (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

During the period of the 1920's to the 1930's the distinguishing feature was the gradual freeing of aviation medicine from foreign influences, the formulation of theoretical principles, the wide development of research in the Central Psychophysiological Laboratory and in outlying units, and the selection of qualified doctors for aviation medicine. During the emergence period three trends emerged: (1) a psychophysiological trend—replacing the former psychotechnical trend, with little difference; (2) a physiological trend—confined to the effect of altitude; and (3) a clinical trend—this led to a well-thought-out system of medical selection for pilots. R.W.H.

N65-21731* National Aeronautics and Space Administration, Washington, D. C.

AVIATION MEDICINE OUTSIDE RUSSIA, 1920–1930

In its Essay on the Hist. of Aviation Med. Apr. 1965 p 76–92 refs (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

Development of aviation medicine in numerous countries (excluding Russia) during the decade 1920 to 1930 is described. Papers presented at five international congresses on aerial communications are discussed. The papers concerned various effects of flight on pilot's health, medical qualifications for flight training, and physiological aspects of operating an airplane. The concept of the ambulance airplane, which was developed during these years, is presented. Aviation medicine research is described in Europe generally, and separately for the United Kingdom, France, Germany, Italy, and the United States. Brief mention is made of activities in Poland, Denmark, Sweden, Australia, Thailand, and Switzerland. J.M.D.

N65-21732* National Aeronautics and Space Administration, Washington, D. C.

THE GOLDEN AGE OF SOVIET AVIATION MEDICINE, 1930–1940

In its Essay on the Hist. of Aviation Med. Apr. 1965 p 93–112 (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

Development of research in aviation medicine in Russia during the decade 1930 to 1940 is described. The founding and organizing of two psychophysiology laboratories is reviewed, and the work of a number of their staff members is discussed; their work concerned design and use of a centrifuge in studying the effects of acceleration on living organisms, the physiology of high flight and night flight, function of the vestibular apparatus, human response to reduced atmospheric pressure in a pressure chamber, and lighting and color illumination of the pilot's cabin. Flights by Russian aviators, said to have established various records, are listed. J.M.D.

N65-21733* National Aeronautics and Space Administration, Washington, D. C.

CONTRIBUTION OF SOVIET MOUNTAINEERING PHYSIOLOGISTS TO AVIATION MEDICINE

In its Essay on the History of Aviation Med. Apr. 1965 p 206–224 (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

Mountain ascents by Russian physiologists during the decade 1930 to 1940, and their studies of high-altitude effects on living organisms, are described. Results of these experiments on both men and dogs were applicable to problems in aviation physiology. The topics of investigation included acclimatization and adaptation of the human organism to reduced atmospheric pressure, anoxia, acid-alkali balance, polyglobulia, olefactory function, salivation, respiration, blood circulation, and chronaximetry studies of skin sensitivity, vestibular apparatus, and excitability of the visual apparatus. J.M.D.

N65-21734* National Aeronautics and Space Administration, Washington, D.C.

AVIATION MEDICINE IN THE USSR DURING THE SECOND WORLD WAR

In its Essay on the Hist. of Aviation Med. Apr. 1965 p 225–253 (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

Reorganization of various Russian aviation medicine research institutes during the Second World War, and the wartime aviation research activities of numerous Russian physiologists and flight doctors, are reviewed. Much of the work of qualified aviation medicine personnel was directed toward problems of the war effort, such as evacuation and treatment of aircrew casualties and training of flight doctors. Aviation research accomplished during this period concerned the etiology of decompression sickness, adaptation of the central nervous system to high altitudes, gas exchange and tissue

respiration following hypoxemia, metabolism under high-mountain conditions, effects of acceleration on fliers, comfortable altitudes for passengers during long flight, and prevention of hypoxemia. J.M.D.

N65-21735* National Aeronautics and Space Administration, Washington, D. C.
A BIBLIOGRAPHY OF WORKS IN RUSSIAN ON AVIATION MEDICINE UP TO 1950
In its Essay on the Hist. of Aviation Med. Apr. 1965 p 254–398 refs (See N65-21725 11-04) CFSTI: HC $7.25/MF $2.25

A bibliography of approximately seventeen hundred Russian publications on aviation medicine is given. Titles are listed in alphabetical order of senior author's last name, and sources are given. J.M.D.

N65-21738*# Texas Inst. for Rehabilitation and Research, Houston.
THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART XIV: EFFECT OF BEDREST ON PLASMA LEVELS AND URINARY EXCRETION OF 17-HYDROXYCORTICOSTEROIDS
D. Cardus, C. Vallbona, F. B. Vogt, W. A. Spencer, H. S. Lipscomb et al Washington, NASA, Apr. 1965 17 p refs
(Contract NAS9-1461)
(NASA-CR-184) CFSTI: HC $1.00/MF $0.50

Plasma levels of 17-hydroxycorticosteroids at 0800, 1200, 1600, 2000 and 2400 hours were determined on six healthy subjects who were submitted to bedrest for 3 days. The determinations were made with a modification of the Peterson method and the Porter–Silber technique. During bedrest the peak level at 0800 seemed a little lower than normal, but the circadian rhythm of 17-hydroxycorticosteroids was not modified. During bedrest and isometric exercises, the rhythm and the levels of 17-hydroxycorticosteroids were normal. Relatively short periods of physical inactivity seem to have no effect on the circadian rhythm of 17-hydroxycorticosteroids. Author

N65-21756*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF GUST-INDUCED AND MANEUVERING ACCELERATION STRESS ON PILOT-VEHICLE PERFORMANCE
Thomas E. Wempe [1963] 41 p refs Presented at the 35th Aerospace Med. Assoc. Meeting, Miami, Fla., 11–13 May 1964
(NASA-TM-X-51748) CFSTI: HC $2.00/MF $0.50

A piloted motion simulator study, using a height control simulator, was made to assess the effects of gust-induced and maneuvering acceleration stress on pilot performance in a low-level penetration attack mission. The ability of the pilot to maintain a relatively constant small ground clearance, while viewing aircraft instruments and a display depicting the terrain configuration ahead and below, was determined by changes in the following parameters: (1) moving cockpit versus fixed cockpit simulation; (2) subsonic versus supersonic simulated aircraft velocities; (3) calm air versus turbulent air conditions; (4) additional requirements for secondary task performance; (5) introduction of a bending mode frequency near the visceral resonance frequency; and (6) failure of an automatic terrain-following system monitored by the pilot. The results of each parameter variation are described, and substantiate the need for warning devices. G.G.

N65-21766*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
STUDIES OF MANUAL CONTROL SYSTEMS Progress Report No. 6, 19 Oct. 1964–18 Jan. 1965
19 Mar. 1965 37 p
(Contract NASw-668)
(NASA-CR-62251) CFSTI: HC $2.00/MF $0.50

Interaction in a two-axis, mixed-dynamic tracking task was investigated to determine if tracking performance in a given axis would differ when an axis was tracked alone and when an additional axis having dissimilar dynamics was simultaneously tracked. The normalized error in the position axis was more than doubled by the addition of the second axis. This effect was significant to below the 0.005 level. This increase in error was accompanied by a corresponding change in the human operator's describing function. There was also a 10% degradation in the acceleration axis in going from the single-axis to the two-axis task. Describing function graphs are presented. R.N.A.

N65-21804# Joint Publications Research Service, Washington, D. C.
RADIATION BARRIER AND MAN IN SPACE
Yu. Volynkin, P. Saksonov, and N. Dobrov 19 Apr. 1965 9 p Transl. into ENGLISH from Izv. (Moscow), 21 Mar. 1965 p 2
(JPRS-29656; TT-65-30768) CFSTI: $1.00

CONTENTS:
1. MAN IN SPACE p 1–4
2. THE RADIATION BARRIER Yu. Volynkin and N. Dobrav p 5–7

N65-21823# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology
CHEMICAL PROTECTION IN HEALTH PHYSICS
James L. Leitch Apr. 1965 20 p refs
(Contract AT(04-1)-GEN-12)
(UCLA-12-551)

The compounds that have been reported as having protective action against the lethal effects of ionizing radiation are reviewed. A more extensive discussion is given on experimental work using AET (2-aminoethylisothiouronium bromide hydrobromide) and 5-HT (5-hydroxytryptamine creatinine sulfate = serotonin) and of the variations in its protective action as influenced by the total dose of X- or γ-radiation, the dose rate, and the dose of drugs administered. Particular emphasis is placed on the possible applications of protective chemicals to health physics problems. Author

N65-21824# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology
COMPARISON OF PROTECTION AGAINST X- AND GAMMA RADIATION BY AET PLUS 5-HT
James L. Leitch Apr. 1965 15 p refs
(Contract AT(04-1)-GEN-12)
(UCLA-12-552)

The DAL-Swiss female mice were irradiated either with 250-kVp X-rays at 15 mA (HVL = 2.3-mm Cu) or with gamma rays from a 10000 curie Co^{60} source. In any one experiment, half the mice were given, intraperitoneally, 10 μM AET (2-aminoethylisothiouronium bromide hydrobromide) plus 1 μM 5-HT (5-hydroxytryptamine creatinine sulfate). Protection is evaluated on the basis of the percent increase in mean

survival time of pretreated mice compared with that of mice not pretreated prior to irradiation. When the above drug combination was administered 5 to 10 min prior to the start of a 1200-R dose of whole-body X-irradiation delivered at 80 R/min, protection was observed. Animals similarly pretreated but irradiated with Co^{60} gamma rays (total dose = 1200 R at 80/min) show an increased mean survival time greater than that of animals exposed to X-rays. A differential effect of the two types of radiation on the catabolism of the drugs is suggested. Author

N65-21854# Texas Christian Univ., Fort Worth. Inst. of Behavioral Research
DIMENSIONS OF STIMULUS SITUATIONS WHICH ACCOUNT FOR BEHAVIOR VARIANCE Quarterly Status Report
S. B. Sells 1 Jul. 1964 6 p refs
(Contract Nonr-3436(00))
(AD-602369)

An investigation based on quantitative measurement, dimensional description, and eventual taxonomic analysis of physical and social environmental variables influencing individual behavior is presented. Data was collected from various cross-sections of the student body at Texas Christian University. Reported are results from a taxonomic analysis, an analysis of group dimensions of campus organization, and studies of the meteorological effects on day-to-day fluctuation in anxiety level. A general review of the literature concerned with the detailed documentation of environmental variables is also presented. S.C.W.

N65-21879# Indiana Univ., Bloomington. Dept. of Anatomy and Physiology
THE GASEOUS ENVIRONMENT AND TEMPERATURE REGULATION Annual Progress Report, Mar. 1, 1963–Sep. 1, 1964
Robert W. Bullard [1964] 31 p refs
(Contract DA-49-0070-MD-947)
(AD-446902)

A neural rather than a thermal mechanism is suggested for a rapid sweating rate response to heavy physical exertion in a warm environment. The possibility that the response is moderated through the firing of thermal receptors either in the working muscles themselves or in contact with the venous drainage of these muscles is considered. A similar sweating response was seen in a cool room (30° to 23° C) only in skin areas locally heated or treated with pilocarpine, indicating that the temperature and activity state of sweat glands can have considerable influence on their function. Sweating in the recovery period immediately following CO_2 respiration is greatly depressed, along with skin and deep body temperature. However, sweating then returns to a normal rate with lower deep body temperatures, but with higher skin temperatures at the same ambient temperature. Intracranial temperature measurements by the use of self-repetitive ultrasonic instrumentation are being tried. An instrument is being built with greater stability at the required resolution. Reprints of the published studies are appended. L.S.

N65-21882# Joint Publications Research Service, Washington, D. C.
CYBERNETICS, THOUGHT, AND LIFE
A. I. Berg et al 26 Apr. 1965 496 p refs Transl. into ENGLISH of the book "Kibernetika, Myshleniye, Zhizn'" Moscow, 1964 p 1-511
(JPRS-29764; TT-65-30825) CFSTI: $7.95

This collective monograph on cybernetics is divided into (1) cybernetics as a science; (2) cybernetics and life; (3) cybernetics and the study of cognitive psychic processes; and (4) cybernetics and problems of logic and methodology of scientific research. Soviet research on the methodological aspects of cybernetics is covered, and the contributions of philosophers and the various specialists in such fields as mathematics, logistics, biology, and psychology are discussed. G.G.

N65-21897# Institute for Behavioral Research, Inc., College Park, Md.
EXPERIMENTS IN HUMAN COLOR VISION Annual Progress Report, Aug. 1–Dec. 31, 1964
John Krauskopf 31 Dec. 1964 9 p refs
(Contract DA-49-193-MD-2669)
(AD-455490)

Work on three projects is reported: (1) Vision during saccadic eye movements—experiments reported tested the classical theory that vision is inhibited during involuntary saccadic eye movements. Absolute thresholds and vernier acuity thresholds were measured either during saccades or at some fixed time following saccades. If inhibition occurs thresholds should be elevated during saccades. No such effect was found. The confidence limits of the thresholds precluded existence of any meaningful difference in thresholds. (2) Effect of small monochromatic stimuli—significance of previous experiments is reviewed; it is concluded possible to achieve conditions under which only one color receptive field is stimulated. (3) Behavioral measurement of spectral sensitivity in turtle—turtles were trained to discriminate steady, as opposed to flickering, lights; experiments with white lights show that the discrimination breaks down as the brightness of the two components is approximately equated. Experiments with colored lights indicated the need for an apparatus providing more intense stimuli. Author

N65-21933# California Univ., Livermore. Lawrence Radiation Lab.
EFFECTIVE HALF-LIFE OF FALLOUT RADIONUCLIDES ON PLANTS WITH SPECIAL EMPHASIS ON IODINE-131
Stanley E. Thompson 29 Jan. 1965 19 p refs
(Contract W-7405-ENG-48)
(UCRL-12388) CFSTI: $1.00

The discrepancy between the observed mean reduction times for fallout radioisotopes deposited on plants and the radioactive half-lives of the nuclides is due to a number of variables. The same variables operate regardless of isotope involved, and are related to the behavior of particles on plants. Physical and biological factors modify this behavior, accounting for the differences noted. The most probable effective half-life of any radioisotope on plants can be calculated by

$$T_3 = \frac{13T_2}{13 + T_2}$$

where T_3 = effective half-life, and T_2 = radiological half-life. Author

N65-22061# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PERFECTION OF INTEROCEPTIVE ANALYSIS DURING ACUTE HYPOXEMIA AND HYPERCAPNIA IN MAN

A. B. Gandel'sman and N. B. Prokopovich 20 Feb. 1963 13 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 12, no. 2, 1962 p 223-228
(FTD-TT-62-1903/1+2+4; AD-298655)

The physiological mechanism of interoceptive analysis developed during athletic training was studied by a comparison of the objective dynamics of acute hypoxemia and hypercapnia with the data of self-evaluation of the test subjects concerning the degree of sensation of increasing dyspnea. A total of 300 experiments were carried out by placing 17 athletes in a closed space and recording the oxygen saturation of their blood by an oxyhemograph. Hypercapnia was judged by the percentage of CO_2 in the final air of the closed space. Results showed that highly trained athletes achieved high accuracy in evaluating the changes in the oxygen saturation level of their blood after only one or two experiments, and that the accuracy of self-evaluation was considerably lower in untrained men. The main source for the interoceptive sensation seems to be the stimulation of the chemoreceptors of the vessel walls upon increase of the stimulus force by hypoxemic and hypercapnic shifts. Development of acuity of vascular feeling facilitates the distribution of physical loads in time. Improvement of the interoceptive analysis by teaching without motor training is possible. G.G.

N65-22067# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CERTAIN EXPERIMENTAL OBSERVATIONS OF THE EFFECT OF A HIGH FREQUENCY ELECTROMAGNETIC FIELD IN VIVE AND IN VITRO
K. Marha 18 Mar. 1965 11 p refs Transl. into ENGLISH from Pracovni Lekar. (Prague), v. 15, no. 6, 1963 p 238-242
(FTD-TT-64-898/1+2; AD-460316)

A series of high frequency experiments on male rats in a frequency band of 12, 10, 6, and 3 cm found the functional density more than lethal. The typical rat behavior started with an effort to escape, followed by paralysis of the extremities, convulsions, and ended in death. Interruption of the experiments before the convulsions started resulted in a 100% regeneration. Exposure of the animals for several times in 3-minute intervals to a field of the same density, or preexposure to a 100 times smaller dosage had a cumulative effect on the cm wave potential. Pulsed HF operation was biological by more effective than cw operation. Experiments in vitro at the same operational density and an exposure time up to 120 min established thermal denaturation changes in human serum albumin. It was concluded that the harmful effect of an HF field cannot be explained by the heating of the organism. There is a possibility that small dosages of Hf may cause genetic changes. G.G.

N65-22069# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
WHEN DOES RADIATION RECEDE?
P. Sazonov 11 Feb. 1965 10 p Transl. into ENGLISH from Krasnaya Zvezda (Moscow), no. 10, 12 Jan. 1964 p 6
(FTD-TT-64-948/1; AD-611548)

The possibility of protecting human beings against ionizing radiation with the aid of chemical substances is discussed. The effectiveness and the toxicity of several known radioprotective agents is described. TAB

N65-22075# Presbyterian-St. Luke's Hospital, Chicago, Ill. Div. of Pathology
AN EVALUATION OF STEROID ANTIHISTAMINIC THERAPY IN EXPERIMENTAL CEREBRAL EDEMA
Raymond A. Clasen, Pauline M. Cooke, Sylvia Pandolfi, George Carnecki, and George M. Hass Brooks AFB, Tex., AF School of Aerospace Med., Dec. 1964 20 p refs
(Contract AF 41(609)-1908)
(SAM-TDR-64-56; AD-458897)

Focal areas of hemorrhagic necrosis were produced in the brains of anesthetized monkeys. The animals were followed for a period of 12 hours, after which they were sacrificed and the cerebral hemispheres were analyzed chemically for their electrolyte and water content. A second group of animals was treated with a combination of prednisolone and chlorprophenpyridamine maleate given 1 hour after injury. No evidence that this form of treatment reduced the edema associated with these lesions was obtained. Author

N65-22076# School of Aerospace Medicine, Brooks AFB, Tex. Aeromedical Indoctrination Dept.
INDUCTION OF RESISTANCE TO MOTION SICKNESS THROUGH REPEATED EXPOSURE TO CORIOLIS STIMULATION
Patrick J. Dowd Dec. 1964 14 p refs
(SAM-TR-64-87; AD-460110)

This report presents information of a method of repeated self-induced Coriolis stimulation, using four conditions: chair tilt, head movements in the lateral plane, head movements in both lateral and frontal planes, and head movements only in the frontal plane, on the SAM biaxial stimulator. The subject was evaluated for vestibular sensitivity after several incidents of motion sickness during flight training on the T-37 aircraft. Final testing after completion of this programed self-induced Coriolis stimulation indicated a resistance to motion sickness as determined from general autonomic reactions and data analysis of electronystagmograms. The subject has completed his solo-flight training on the T-37 aircraft without any report of motion sickness. Author

N65-22081# Louisiana State Univ., Baton Rouge. Dept. of Food Science and Technology
RADIATION PASTEURIZATION OF SHRIMP AND OYSTERS Final Summary Report, Jan.-Dec. 1964
Arthur F. Novak and Joseph A. Liuzzo Washington, AEC, 15 Jan. 1965 30 p refs
(Contract AT(40-1)-2951)
(ORO-626) CFSTI: $2.00

The preservation of shrimp and oysters by radiation pasteurization using cobalt 60 was studied. Field trials on public acceptance of radiation pasteurized shrimp and oysters were successful according to results obtained from organoleptic, chemical, and bacteriological tests of the products. Low level radiation extended the storage life of shrimp from 7 to 14 days and of oysters from 5 to 10 days. Physiological studies of radiation-resistant bacteria in shrimp suggested alterations in the metabolic roles of NAD, Coenzyme A and thiamine pyrophosphate, induced by low dose radiation. An investigation of radiation induced changes in the kinetics of shrimp enzymes showed that radiolysis products formed during the low dose gamma irradiation were responsible for the inactivation of phenolase and the subsequent reduction of melanosis. The use of liquid nitrogen for storage of shrimp prior to irradiation resulted in shrimp superior to the ice stored controls. Bacteriological studies with irradiated oysters showed a reduction in count of 95%. The physiology of radiation-resistant bacteria in oysters was investigated in respect to the influence of irradiation in the normal metabolic patterns of these bacteria. Chemical analysis of oysters for pH, glycogen, ammonia nitrogen, trimethylamine nitrogen, and indole showed no significant differences

between the irradiated and nonirradiated samples. Analysis of thiamine, riboflavin, niacin, and pantothenic acid in oysters showed that thiamine and niacin concentrations were reduced by irradiation, whereas riboflavin and pantothenic acid increased. S.C.W.

N65-22094# Bureau of Commercial Fisheries, Gloucester, Mass. Technological Lab.
STUDY OF IRRADIATED-PASTEURIZED FISHERY PRODUCTS
Joseph W. Slavin and Louis J. Ronsivalli Washington, AEC 30 Nov. 1964 59 p refs
(Contract AT(49-11)-1889)
(TID-21600) CFSTI: $3.00

Research results on radiopasteurization of fish and fish products are reported. Optimum dose and acceptance levels for irradiated pollock, ocean perch, cod, and mackerel fillets were established, and the effect of preirradiation quality on postirradiation shelf life of cod fillets was determined. The suitability of plastic materials for packaging irradiated products, changes that occur in flavor and odor as a result of irradiation and storage, and bacterial quality of irradiated samples are also discussed. Results are considered in light of their importance to food technology. S.C.W.

N65-22098# Atomic Energy Commission, Washington, D. C. Div. of Technical Information
BIOLOGICAL APPLICATIONS OF GAMMA RADIATION
Helen L. Ward, comp. Jan. 1965 99 p refs
(TID-3580) CFSTI: $3.00

This bibliography contains 962 selected references on the uses of gamma radiation in all fields of biological and medical research. The major reference sources were: *Nuclear Science Abstracts, The Bibliography of Agriculture, Biological Abstracts, Chemical Abstracts, Index Medicus,* and *International Abstracts of Biological Sciences.* The period covered was 1958 through 1963. Author and report number availability indexes are included. Author

N65-22112# Joint Publications Research Service, Washington, D. C.
INTRAOCULAR TENSION AND BLOOD PRESSURE
T. A. Aleksidze 26 Apr. 1965 17 p Transl. into ENGLISH from the book "Nekotoryye Voprosy Regulyatsii Vnutriglaznogo Davleniya" Tbilisi, 1964 p 12–26, 134–136
(JPRS-29756; TT-65-30819)

Results of an investigation on the relationship between systemic blood pressure and intraocular pressure as influenced by age, systemic diseases, systemic blood pressure, reserpine, and daily pressure fluctuations, are reported. An extensive survey of the literature which indicates that increased inflow of blood in the eye raises lateral pressure in intraocular vessels thus increasing intraocular pressure, is included in the report. S.C.W.

N65-22113# Joint Publications Research Service, Washington, D. C.
ORIENTATION AND NAVIGATION OF ANIMALS: THE MOST IMPORTANT TRENDS IN RESEARCH IN BIONICS
B. P. Manteyfel, N. P. Naumov, and V. Ya. Yakobi 26 Apr. 1965 16 p Transl. into ENGLISH from Priroda (Moscow), no. 2, 1965 p 26–32
(JPRS-29757; TT-65-30820) CFSTI: $1.00

Results of bionomical investigations on the mechanisms of orientation and navigation used by animals under natural, variable environmental conditions are reported. The role of the receptors in supplying basic faculties for animal orientation such as perception of various signals from the external world, active location, emission of signals, and the reception of their reflections is discussed. Orientation behavior was studied in fish, amphibia, mammals, birds, reptiles, cetaceans, bats, dolphins, and insects. Long distance orientation and navigation were studied in respect to animal migration. It was found that migrations and their direction constituted an inalienable biological property of a given animal species in definite sections of its territory. Investigations on the migratory behavior of fish and birds supported the premise that these animals possessed navigational abilities which enabled them to accurately determine their direction and reach designated geographic points by using more than one route. The importance of bionomical investigations on long distance orientation to technical advancement, and important problems in the field of navigation and orientation are also discussed. S.C.W.

N65-22115# Joint Publications Research Service, Washington, D. C.
USE OF ELECTRONIC COMPUTERS FOR SUBSTANTIATION OF DIAGNOSIS
K. Khidoyatov 28 Apr. 1965 34 p Transl. into ENGLISH Vopr. Vychislitel'noy Mat. i Tekhn. (Tashkent), no. 1, 1964 p 144–179
(JPRS-29799; TT-65-30840) CFSTI: $2.00

The use of the Ural-1 computer for the establishment of diagnosis and treatment of disease is reported. The order of preparation of data in respect to disease complexes, symptom complexes, unconditioned probability of disease complexes, and the order of computer calculation for single and multiple disease complexes are described. Sample problems are included. S.C.W.

N65-22116# Joint Publications Research Service, Washington, D. C.
BIOMEDICAL ASPECTS OF MAN'S FIRST EMERGENCE INTO OUTER SPACE
V. Parin 28 Apr. 1965 7 p Transl. into ENGLISH from Pravda (Moscow), no. 79 (17031), 20 Mar. 1965 p 3
(JPRS-29800; TT-65-30841) CFSTI: $1.00

The special coordination of movements and the ability to orient oneself and move about purposefully under weightless conditions are discussed. The analyzer systems function differently in weightlessness and there is a decrease in the flow of nerve impulses from the sensory elements in muscles and skin. This causes a change in the information connections established in the central nervous system. Unusual impulses from the receptors of the vestibular apparatus create additional difficulties for the mechanisms that regulate the activity of the various organs and systems. The special measures taken to ensure the cosmonaut's safety when he stepped into space are considered. Also, the dangers from meteorites and cosmic radiation are discussed. Further, the role of space medicine in interplanetary flight is included. E.E.B.

N65-22121# Joint Publications Research Service, Washington, D. C.
AN EXPERIMENTAL STUDY OF POLYDISPERSED BACTERIAL AEROSOLS

V. P. Zhalko-Titarenko 30 Apr. 1965 10 p Transl. into ENGLISH from Zh. Mikrobiol. Epidemiol. i Immunobiol. (Moscow), no. 2, 1965 p 68–73
(JPRS-29840; TT-65-30863) CFSTI: $1.00

Viability of the diphtheria bacillus in aerobic media was studied experimentally. To approximate the natural environment of the bacillus, an experiment on the diffusion of a suspension of bacilli in saliva was conducted at 35° C; for comparison, aerosols consisting only of cells of washed bacteria were studied. Graphs for the saliva and water-base experiments show viability as a function of time (up to 120 minutes). In another series of tests, viability in a polydispersed aerosol was investigated at 35°, at about 20°, and below 0° C; the resulting viability graph is shown. It was noted that a delay in saliva evaporation and the prevalence of large particles—conditions which represent the natural state of saliva—favored viability; however, viability was better at temperatures below zero than at 35° C. J.M.D.

N65-22131*# Hawaii Univ., Honolulu.
BODY FLUID VOLUME AND ELECTROLYTE DERANGEMENTS IN FASTING Semiannual Report No. 1, Dec. 1, 1964–Mar. 31, 1965
Terence A. Rogers, Bryant T. Sather, and Myrtle L. Brown Apr. 1965 7 p
(Grant NGR-12-001-010)
(NASA-CR-62298) CFSTI: HC $1.00/MF $0.50

Results are reported of electrolyte balance studies on rats designed to determine whether rats, like man, continue to lose urinary sodium at the onset of a fast and whether this is exacerbated by fasting in the cold. Rats were fed a standard diet containing 20.26-mEq sodium per 100 grams before and after fasting. Sodium balance (sodium intake minus urine sodium) was measured in fasting rats kept at 26° and 3° C. Control animals showed a slightly increased positive balance in cold temperatures. Negative sodium balance in rats fasting at 3° was greater and subsequent retention of sodium upon refeeding was more marked than in those fasting at 26° C. A substantial magnesium excretion by fed and fasted rats exposed to cold temperatures, and a sudden fall of urinary magnesium excretion upon return to warmer temperatures were attributed to a primary response to cold as opposed to a reflection of increased gluconeogenesis. Further investigations were made to determine whether the sodium balance status of rats prior to fasting or cold exposure would affect subsequent sodium losses. Rats fed a sodium deficient diet for 3 days prior to fasting and/or exposure to 3° C did not show a significant negative sodium balance. Weight loss during fasting was lower in rats previously fed sodium deficient diets than in those fed normal diets. Sodium depleted rats showed an even more marked negative magnesium balance than those on a normal diet. Magnesium excretion was terminated abruptly on return to 26° C. S.C.W.

N65-22165*# California Univ., Los Angeles. Brain Research Inst.
THIRD ANNUAL REPORT, JULY 1, 1963–JUN. 30, 1964
[1964] 149 p refs
(NASA-CR-62354) CFSTI: HC $4.00/MF $1.00

The activities of the Brain Research Institute are described and a brief account of its history and organization reported. Institute activities are considered under two main categories which include: (1) independent project research funded by grants assigned to individual investigators, and (2) collaborative research supported by program grants assigned to the institute or to investigators from different departments. Research activities such as project research on neurological disorders, program research including the Brain Information Service, and research training on graduate and postdoctoral level are reviewed as separate entities. Service activities emphasizing the role of the institute in serving the social and scientific community; facility requirements; publications of the institute; and operational support are also reviewed. S.C.W.

N65-22180*# Florida State Univ., Tallahassee. Inst. for Space Biosciences
POTENTIALITIES OF PROTEINOIDS FOR NUTRITIONAL INVESTIGATION
Sidney W. Fox, Kaoru Harada, Gottfried Krampitz, Tadao Hayakawa, and Charles Ray Windsor [1964] 16 p refs *Its* Contrib. No. 034
(Grant NsG-173-62)
(NASA-CR-56268) CFSTI: HC $1.00/MF $0.50

The possibility of chemical, nutritional, and engineering investigations through pansynthesis of proteinaceous compounds is discussed. Thermal synthesis of amino acid compositions from gaseous mixtures of methane, hydrogen, water, and ammonia in silica beds by electrical discharge is briefly outlined and observed results are shown in a table. Heating of dry amino acids containing sufficient proportions of dicarboxylic amino acids at 170° for about 6 hours, and subsequent hydrolysis as well as synthesis of amino acids by Leuchs anhydrides produced proteinoids that contained all the amino acids. Phenylalanine was used in the heating method, and histidine in the synthesis procedure. Chromatograms from a controlled pair of Leuchs anhydrides of the amino acids are shown. Proteinoids can be used instead of peptone by *Lactobacillus arabinosus* and by *Proteus vulgaris*. Their nutritional value can be viewed as synthetic generic protein. The Leuchs proteinoid may be of particular interest for missions requiring an optimally balanced nutritional polymer of amino acids. G.G.

N65-22189*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
GLYCOGEN IN THE NERVOUS SYSTEM. I: METHODS FOR LIGHT AND ELECTRON MICROSCOPY
Rosita F. de Estable, Juan F. Estable-Puig (Univ. de la Rep., Montevideo), and Jaime Miquel [1964] 23 p refs Submitted for Publication
(NASA-TM-X-51741) CFSTI: HC $1.00/MF $0.50

Brain and spinal cord from 25 newborn chickens and 20 adult rats were used to study normal tissue and induced pathological conditions. The tissues were examined by light and electron microscopy. It was found that picroalcoholic fixatives preserve glycogen to a considerable degree but give an inadequate morphological image of glycogen distribution and the specimen is unsuitable for ultrastructural studies. Fixation with Dalton's chrome-osmic fluid seems adequate for ultrastructural cytochemistry of glycogen. Also, it permits routine paraffin embedding of brain slices adjacent to those used for electron microscopy. Enzymatic removal of glycogen in osmic fixed nerve tissue can be done in paraffin embedded tissue and in glycolmethacrylate embedded tissue without removal of the embedding medium. Further, paraphenylenediamine stains glycogen following acid oxidation. E.E.B.

N65-22190*# National Aeronautics and Space Administration, Washington, D. C.
HUMAN FACTORS IN ELECTRONICS

Eugene B. Konecci [1964] 6 p Presented at the 5th Ann. Meeting, Profess. Tech. Group in Human Factors Eng., IEEE, San Diego, Calif., 5–6 May 1964
(NASA-TM-X-51735) CFSTI: HC $1.00/MF $0.50

Eugene B. Konecci, Director, Biotechnology and Human Research, NASA, stated that the greatest contribution the combined fields of human factors and electronics can make is in the area of cybernetics; the essence of this combination reduces to the fact that what the human brain is and what it actually does must be understood. Human factors also must be considered and stated in terms of the potential effects upon total system effectiveness. It was further stated that the greatest need in human factor research is a better understanding of man, his capabilities, and his limitations. E.E.B.

N65-22195*# Ohio State Univ., Columbus. Environmental Physiology Lab.
EMBRYO DEVELOPMENT AND CHICK GROWTH IN A HELIUM–OXYGEN ATMOSPHERE
Harold S. Weiss, Ronald A. Wright, and Edwin P. Hiatt [1964] 33 p refs
(Grant NsG-295-62)
(NASA-CR-56876) CFSTI: HC $2.00/MF $0.50

Fertile chicken eggs were incubated in approximately 79% He–21% O_2 with up to 1% to 2% residual N_2 in a sealed, flexible, plastic isolator in which temperature, relative humidity, O_2 and CO_2 were controlled. Live, healthy chicks were hatched in He–O_2, but only half as many as in a comparable air system. The poorer He–O_2 hatch was due mainly to late embryonic death. Hatching time was similar, but the He chicks were 9% smaller. The He isolator required more electrical power to maintain incubation temperature, but had lower inside surface temperature. During development He embryos showed neither gross defects nor differences in dry wt or in N_2 concentrate, but He eggs lost 27% more wt. During an additional 4 weeks in their respective atmospheres, chick growth and hematology were similar, but the He birds consumed up to 16% more feed. Higher heart and respiratory rates, lower T_B and a tendency to huddle in He suggested that the increased feed intake might be in response to a higher metabolism, stimulated by a more rapid loss of body heat because conduction of heat is 6 1/2 X greater in He than N_2. Sudden removal of chicks into room air after 4 weeks in He–O_2 had no observable effect. Author

N65-22198*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE ROLE OF FEEDBACK IN ADAPTIVE PERCEPTUAL PROCESSES
Ronald A. Kinchla and Richard C. Atkinson [1964] 4 p Presented at the 35th Ann. Meeting of the Aerospace Med. Assoc., Miami Beach, Fla., 11–14 May 1964
(NASA-TM-X-51737) CFSTI: HC $1.00/MF $0.50

Factors which influence an observer when he attempts to identify partially discriminable stimuli were investigated. In the experiment described, each observer attempted to discriminate whether or not a 100-msec, 1000-cps tone was, or was not, added to a constant background of band limited Gaussian noise. The experiment is discussed in detail and the results are given. It was found that the subjects learn to utilize higher order statistical properties of the stimulus presentation schedule in their performance. Also, with no feedback, the sequential effects appear to be attenuated and based primarily on the proceeding response, rather than the proceeding stimulus as was the case with feedback. E.E.B.

N65-22222# Radiation Research Associates, Inc., Fort Worth, Tex.
A COMPARATIVE STUDY OF RADIOACTIVE SOURCE ARRANGEMENTS FOR SIMULATING FALLOUT GAMMA RADIATION FIELDS
R. L. French 15 Jun. 1964 107 p refs
(Contract DA-49-146-XZ-254)
(RRA-T45; AD-612032)

Monte Carlo techniques were used in a study of three basically different approaches to simulating the gamma radiation environment near the air/ground interface due to fallout uniformly distributed on the ground surface. The energy and angular distribution of the photon flux at a receiver 3 feet above the ground due to a Co 60 point isotropic source also three feet above the ground and at separation distances of 100 to 800 feet was computed, and the results bore little resemblance to those from a uniform fallout field. Results computed for a receiver position three feet above idealized Ce 144, Cs 137, and Co 60 infinite plane sources on the ground indicated good simulation of the angular distribution of the gamma-ray dose and, except for energies greater than 1.25 meV, reasonable simulation of the energy spectra from fallout. A third source arrangement, called the "compact simulator", simulated the fallout gamma radiation environment equally well. In the compact simulator, an overhead slab of water acts as a reflector to simulate air scattering. Author

N65-22252# Rome Air Development Center, Griffiss AFB, N. Y.
THE INTENSITY-TIME RELATIONSHIP FOR FORM IDENTIFICATION
Richard C. Sturtevant Feb. 1965 18 p refs
(RADC-TR-65-16; AD-613557)

The purpose of this experiment was to determine the effect of exposure time and intensity on a form identification response such as might be encountered in a military Command and Control display situation. A conventional psychophysical method was used to determine the applicability of the Bunsen–Roscoe Law (Intensity X Time = a Constant up to a critical duration; and Intensity = a Constant above a critical duration). Exposure time thresholds were found for three subjects for each of five geometric forms at each of five intensities ranging in value from 0.005 to 1 foot-lambert. It was found that the Bunsen–Roscoe Law did not hold, but that time was a more important factor than intensity in identifying the forms. The results are discussed in terms of detection vs. identification of stimuli, and implications for Command and Control display requirements are pointed out. Author

N65-22288 Army Natick Labs., Mass.
RADIATION BIODOSIMETRY AND SCREENING FOR RADIOPROTECTIVE COMPOUNDS
Hillel S. Levinson and Esther B. Garber *In* Army Dept. Army Sci. Conf. Proc., Vol. II [1965] p 169-183 refs (See N65-22275 12-34)

The possibility that the release of intracellular substances from living cells might form the basis for a useful system of dosimetry was explored. Suspensions of bakers' yeast, Saccharomyces cerevisiae, were used in these investigations. This organism is produced under uniform conditions and is easily and inexpensively procured commercially. Further, upon radiation this microorganism releases easily measurable phosphate into the suspending medium. In every case the radioprotective substances—ascorbic acid, mercaptoethanol amine, sodium thioglycolate, thiourea, and cysteine—inhibited the release of yeast phosphate, although colony-forming

capacity of the yeast cells was unprotected. The experimental data offer promise for use of the system in a screening procedure for radioprotective compounds. Tris and sodium cacodylate offer possibilities as simple broad range dosimeters. Irradiated tris buffer gave a positive ninhydrin test for amino-N linear with dose from approximately 2×10^5 to 2×10^6 rads. Irradiated cacodylate gave a positive Fiske–SubbaRow test with a linear response to approximately 4×10^6 rads. E.E.B.

N65-22294 Walter Reed Army Inst. of Research, Washington, D. C.

A MORPHOLOGIC STUDY OF THE PATHOGENESIS OF EXPERIMENTAL CHOLERA IN THE INFANT RABBIT

H. Thomas Norris, Richard A. Finkelstein, and Helmuth Sprinz *In* Army Dept. Army Sci. Conf. Proc., Vol. II [1965] p 247–259 refs (See N65-22275 12-34)

The morphologic response of the gastrointestinal tract of the 10-day old rabbit to intact and to ultrasonically disrupted cholera vibrios, to broth in which cholera vibrios have been grown for 18 to 24 hours, and to cholera endotoxin is reported. The morphologic response of the gastrointestinal tract of the suckling rabbit to viable cholera vibrios, ultrasonically disrupted cholera vibrios, and to sterile filtrates of broth in which cholera vibrios were grown resembled the acute phase of cholera in other experimental models and the human disease. All shared the same basic pathological picture. Throughout the disease the intestinal epithelium remained intact. It is through this intact epithelium that the cholerigenous moiety of the inocula acts causing copious diarrhea of fluid resembling rice water, accumulation of large amounts of fluid in the lumen of the large and small bowel, and death resulting from the severe dehydration. This cholerigenous moiety is absent in cholera endotoxin. Further, it was concluded that cellular, vascular, and neural factors all play a role in the pathogenesis of experimental and human cholera. E.E.B.

N65-22296 Aberdeen Proving Ground, Md. Army Human Engineering Labs.

A DESIGN FOR ANIMAL-HEARING RESEARCH

John J. Romba *In* Army Dept. Army Sci. Conf. Proc., Vol. II [1965] p 275–279 refs (See N65-22275 12-34)

The relative stability of hearing sensitivity of individual subjects over a period of time, and orderly changes of sensitivity occurring when each animal was subjected to various experimental conditions were noted. Patterns appeared which could be recognized as belonging to a particular animal. Characteristic hearing patterns found in individual subjects under normal environmental conditions and the patterns which result from exposure to stress or stimuli are described. A characteristic feature found in individual threshold curves of most subhuman primates is the sharp tonal dip in sensitivity which occurs at about 4000 cps. Another pattern of importance is the amount of individual variability. Also some animals show patterns of variability which differ for different parts of the sensitivity curve. Two animals studied displayed a systematic reduction in the amount of initial shift as a function of increasing number of exposures. It appeared that the auditory mechanism became more and more resistant to the damaging effects of the loud noises. Variables which are important factors in hearing research are subjects, noise exposure, test methods, and data handling. E.E.B.

N65-22299 Army Biological Labs., Fort Detrick, Md.

THE PURIFICATION AND CHARACTERIZATION OF STAPHYLOCOCCAL ENTEROTOXIN B

Edward J. Schantz, William G. Roessler, Jack Wagman, Leonard Spero, David Stefanye et al *In* Army Dept. Army Sci. Conf. Proc., Vol. II [1965] p 309–319 refs (See N65-22275 12-34)

A method is described for the purification of enterotoxin B from *Staphylococcus aureus* by chromatographic procedures employing carboxyiic acid resins that results in higher purity and larger yields. The toxin was produced by culturing *S. aureus* strain for 18 hours with aeration in a medium containing 1% N-Z-amine A, 0.001% thiamin, and 0.001% nicotinic acid adjusted to pH 6.5. The culture was centrifuged to remove the bulk of the cells. After dilution with water, the toxin was removed from the culture with the resin partly neutralized to pH 6.4. The toxin was then removed from the resin by fractional elution with 0.5-molar sodium phosphate at pH 6.8 in 0.25-molar sodium chloride. The fraction containing the toxin was then dialyzed to remove the salts. The procedure was repeated at a slightly higher pH and the toxin adsorbed and chromatographed on a column of carboxymethyl cellulose. Physical and chemical characterization of the toxin and a biological evaluation are included. E.E.B.

N65-22304 Walter Reed Army Inst. of Research, Washington, D. C.

THE EFFECTS OF MASSIVE DOSES OF IONIZING RADIATION UPON CONDITIONED AVOIDANCE BEHAVIOR OF THE PRIMATE

Joseph C. Sharp and Joseph V. Brady *In* Army Dept. Army Sci. Conf. Proc., Vol. II [1965] p 375–789 refs (See N65-22275 12-34)

The effects of massive and acute doses of whole-body X-radiation on the ability to accomplish relatively simple, highly motivated tasks requiring periodic response were investigated. Adult male primates (macaca mulatta), weighing from 3.8 to 5.2 kg were used for the experimentation. Procedures and results are given in detail. An important conclusion of the study was that for practical military purposes survival time will be less useful for military planning than behavioral indexes. This is particularly true following doses below 20000 R. At 10000 R the difference between survival time and the time when the monkey last performed within normal limits averaged about 7 hrs. At higher doses this difference became progressively less, so that at 40000 R there was a 6-hr difference. Doses of this magnitude resulted in marked behavioral disintegration within 30 minutes. E.E.B

N65-22306 Armed Forces Inst. of Pathology, Washington, D. C.

HOMOGRAFT REJECTION IN THE FETAL LAMB

A. M. Silverstein *In* Army Dept. Army Sci. Conf. Proc., Vol. II [1965] p 401–412 refs (See N65-22275 12-34)

Procedures were developed that permit orthotopic skin grafting of the fetal lamb in utero without the interruption of pregnancy. The fetus was found to reject orthotopic skin homografts applied at any time after the 77th day of gestation. Prior to this gestational age, grafts remained in place without stimulating any detectable immunologic response. Once the fetus achieves the ability to reject the graft, the process occurs with the same competence and rapidity as in the adult. Graft rejection in the fetal lamb in unaccompanied by formation of plasma cells or by the production of typical immunoglobulins, thus supporting the suggestion that circulating antibody does not play an obligatory role in the process. Author

N65-22311 Army Biological Labs., Fort Detrick, Md.

GROWTH OF SELECTED ARBOVIRUSES IN SERUM-FREE SUSPENSION CELL CULTURES

H. R. Tribble, Jr., H. J. Hearn, Jr., S. C. Nagle, Jr., and W. T. Soper *In* Army Dept. Army Sci. Conf. Proc., Vol. II [1965] p 469–481 (See N65-22275 12-34)

The ability of animal cell suspension cultures grown in three types of serum-free media to support the replication of Venezuelan equine encephalomyelitis virus was demonstrated. The interval of viral growth in the infected cultures was divisible into two phases, acute and chronic, separated into a transition phase. During the acute phase, large amounts of virulent virus were produced. The observed occurrences of a chronic state of infection in the cultures and the step-wise decline in virulence of the chronically produced virus for various laboratory hosts are described. Yellow fever virus replicated in HeLa and chick embryo cell lines. A widely differing qualitative response was detected because of the rapid selection of an immunogenic population in the chick embryo cells that was nonlethal for monkeys. In contrast, HeLa cultures produced a highly virulent population that rarely failed to infect without causing lethality in monkeys. E.E.B.

N65-22312 Army Medical Research Unit, Balboa Heights (Canal Zone).
THE EFFECT OF MIGRATING NEMATODE LARVAE AS A PROVOKING FACTOR IN VIRAL ENCEPHALITIS IN MICE
Bryce C. Walton *In* Army Dept. Army Sci. Conf. Proc., Vol. II [1965] p 483–492 (See N65-22275 12-34)

The effects of intraperitoneal inoculation of mice with sublethal dosages of each of three neutrotropic arboviruses—Eastern equine encephalitis (EEE), Ilheus (Ilh), and Japanese B encephalitis (JBE)—were reported. These inoculations were timed to coincide with the migration of *Trichinella spiralis* larvae. Although minor variations were used in individual experiments, all were designed to compare effects among three groups of young adult male mice: the dual infection group, which received both *Trichinella* and the virus; the *Trichinella* control group; and the virus group. Young mice given a combined infection with *T. spiralis* and a neuropathogenic arbovirus extraneurally showed a much higher mortality rate than mice given either agent separately. Distinct differences in the degree of this synergism were apparent with different viral agents, being very pronounced with EEE and quite minimal with Ilheus. E.E.B.

N65-22386# Naval Ordnance Test Station, China Lake, Calif. Underwater Ordnance Dept.
A BIBLIOGRAPHY OF CETACEA, LITERATURE PUBLISHED BETWEEN 1949 AND 1963
Ina L. Squire, comp. Dec. 1964 121 p refs
(NAVWEPS-8645; NOTS-TP-3686; AD-613005)

The bibliography was compiled as part of a continuing program of Cetacea research initiated at the Naval Ordnance Test Station. The initial collection of references has been extended to include pertinent literature published between the years 1949 and 1962. It has been assembled in categories designed to assist investigators pursuing specialized aspects of Cetacean research TAB

N65-22392# Army Chemical Center, Edgewood, Md.
A SIMPLE METHOD FOR MEASURING PUPIL SIZE
Herbert Rakatansky and Lloyd E. Matter Jul. 1964 8 p
(CRDL-TM-2-3; AD-444280)

Measurement of minimal pupil size changes during drug exposure is often difficult. A method was developed utilizing a calibrated television system as a measuring tool. This apparatus permits simple, accurate and reproducible observations with minimal discomfort and danger to the subject. Cooperative subjects with light irises have been consistently measured to approximately 1/4-mm change in pupil size. Author

N65-22425# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CERTAIN PROBLEMS OF CONTEMPORARY BIOLOGICAL TELEMETRY
V. V. Parin and R. M. Bayevskiy 18 Feb. 1965 22 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 50, no. 8, 1964 p 924–933
(FTD-MT-64-416; AD-612376)

Biotelemetric systems, based on the application of a radio link for communication between the source of information and the recording instrument, are considered. Emphasis is placed on dynamic biotelemetry, where the transmitter is positioned on the investigated subject thereby allowing the recording of biological data during movement and activity. Endoradio probes include implanted transmitter systems which receive their power supply by autonomous feed, inductive feed, external feed, and passive radiators with feed from biological sources of energy. The method of control of the transmitting device is the criterion that determines its structure and design features. It is assumed that telemetric systems with biocontrol will be feasible in space medicine. Construction and schematic resolutions of biotelemetric systems depend mainly on their purpose and area of application. G.G.

N65-22447# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEMS OF RESCUING CREWS AT EMERGENCIES AT GREATER SPEEDS AND HIGH FLIGHT ALTITUDES
A. V. Chesalov 1 Apr. 1965 18 p Transl. into ENGLISH from Tekhn. Vozdushnogo Flota (USSR), 1964, no. 10 p 7–12
(FTD-TT-65-260/1+2; AD-613461)

General philosophy on the value of scientific leadership in the military is presented. TAB

N65-22466# Tufts Univ., Medford, Mass.
PROCEDURAL CONSTRAINT AND TASK PERFORMANCE
Thornton B. Roby and Susan Goldberg Bedford, Mass., AFSC, Electron. Systems Div., Nov. 1964 47 p ref
(Contract AF 19(628)-2450)
(ESD-TR-64-663; AD-613532)

Persons or groups assigned to certain tasks are typically required to follow institutionally originated rules of action or constraints that limit the range of their task behavior. Ordinarily these procedural rules are based on general experience with the task situation and are designed to guard against serious errors: however they have the secondary effect of reducing the potential for superior enterprise or discretion on the part of the performing agent. The question or practical importance concerns the specific conditions that militate in favor of either increased or decreased superordinate control. The present investigation develops a laboratory methodology for studying this problem. The general task condition used was an abstract maze in which subjects had to select a path between designated points. An attempt was made to produce experimental analogs of visibility, or task information accessible to the subject, and environmental bias, or general favorability for exploratory behavior. Three formal studies are reported, and these indicate the relevance of the experimental factors; but the results are too inconsistent across studies to be definitive. Based on these results, certain modifications are suggested for future research. Author

N65-22475# Air Force Systems Command, Wright-Patterson AFB, Ohio. Behavioral Sciences Lab.

PREDECISIONAL PROCESSES IN DECISION MAKING: PROCEEDINGS OF A SYMPOSIUM

Darwin P. Hunt, ed. et al Dec. 1964 207 p refs Symp. held at Wright-Patterson AFB, Ohio, Apr. 1962

(AMRL-TDR-64-77; AD-613180)

Predecisional processes may be characterized as the search for, the acquisition of, and the evaluation of information prior to the choice of a course of action. The objectives were an assessment of the adequacy of present decision theories in dealing with human decision making behavior; an assessment of other approaches to decision making situations; and an analysis of predecisional processes. Seven papers are presented that analyze this area from several different theoretical viewpoints. Transcripts of the discussions are also included. Author

N65-22476# Mayo Clinic, Rochester, Minn.

END-EXPIRATORY PLEURAL PRESSURES IN DOGS IN SUPINE AND PRONE BODY POSITIONS STUDIED WITHOUT THORACOTOMY Final Report, 15 Jul. 1963–1 Nov. 1964

Wilhelm J. Rutishauser, Natalio Banchero, Anastasio G. Tsakiris, Ralph E. Sturm, and Earl H. Wood Wright-Patterson AFB, Ohio, AMRL, Dec. 1964 31 p refs

(Contract AF 33(657)-8899; Grants NsG-327; NIH H-3532; AHS-CI-10)

(AMRL-TR-64-133; AD-613541)

Intrapleural pressures were measured simultaneously by saline-filled catheters from 2 to 5 different sites in the potential right pleural space of nine anesthetized dogs while the animals were supported in the supine and prone positions by means of molded half-body casts. Intrapleural tips of the catheters were placed at heart level in the cephalad-caudad dimension at ventral (retrosternal) and dorsal (paravertebral) sites in the thorax. The site of each catheter tip was measured from biplane X-rays taken in each position. The average vertical distance between the dorsal and ventral catheter tips was 10.6 (S_e, of mean = 0.3) cm. In the supine position, mean end-expiratory pressure at the superior (ventral) catheter tip was −11.9 (= 0.7) cm, H_2O as compared to −5.0 (= 0.5) cm, H_2O at the dependent (dorsal) site giving an average gradient of 0.64 (= 0.04) cm, H_2O/cm, vertical distance between the two recording sites. The respective values in the prone position were: −9.0 (= 0.6) cm, H_2O superior (dorsal) site: +0.7 (= 0.05) cm, H_2O/cm, vertical distance. The slightly positive value for retrosternal pleural pressure and the greater dorsal-ventral gradient, when in the prone position, may be due to the weight of the heart. During the increase in weight induced by acceleration, these pressures were multiplied roughly in proportion to the G level and the difference in gradient between the two body positions was maintained. Author

N65-22477# Radio Corp. of America, Princeton, N. J. RCA Labs.

ANALYSIS OF MARKOV CHAIN MODELS OF ADAPTIVE PROCESSES Final Report, May 1963–May 1964

K. R. Kaplan and J. Sklansky Wright-Patterson AFB, Ohio, AMRL, Jan. 1965 111 p refs

(Contract AF 33(657)-11336)

(AMRL-TR-65-3; AD-613075)

Learning and adaptation are considered to be stochastic in nature by most modern psychologists and by many engineers. Markov chains are among the simplest and best understood models of stochastic processes and, in recent years, have frequently found application as models of adaptive processes. A number of new techniques are developed for the analysis of synchronous and asynchronous Markov chains, with emphasis on the problems encountered in the use of these chains as models of adaptive processes. Signal flow analysis yields simplified computations of asymptotic success probabilities, delay times, and other indices of performance. The techniques are illustrated by several examples of adaptive processes. These examples yield further insight into the relations between adaptation and feedback. Author

N65-22496# Naval Ordnance Lab., White Oak, Md.

PROPOSAL FOR AN ANALOG COCHLEA

F. E. Warnock Mar. 1965 49 p refs

(NOLTR-64-191; AD-611778)

Using Bionic's precept that nature can suggest better solutions to engineering problems, an electrical ear model was designed for analyzing and classifying complex audio sounds. This lumped constant simulation approximates the transfer of sound energy to a mechanical displacement of the basiar membrance, which is within the inner ear or cochlea. Essentially, this model is a hardware adaption of the model proposed by James L. Flanagan of Bell Laboratories. The model consists of an electrical middle ear simulation, followed by an "artificial" cochlea. This cochlea consists of a special 201 tap delay line whose taps drive cochlea filters. These cochlea filters drive output amplifiers which have been designed to compensate for losses and drive artificial neurons used for processing the parallel outputs. For building this specific hardware model, the component values, tolerances, and specifications are included, along with considerations on signal level, dynamic range, noise, and power consumption. Author

N65-22501# Central Lab. for Radiological Protection, Warsaw (Poland).

THE EVALUATION OF RADIOLOGICAL PROTECTION CONDITIONS IN ISOTOPE LABORATORIES IN POLAND, IN 1958–1963 [ANALIZA STANU OCHRONY PRZED PROMIENIOWANIEM W PRACOWNIACH IZOTOPOWYCH W POLSCE'W LATACH 1958–1963]

T. Musialowicz, S. Dyz, J. Jakubiak, and Z. Wanat 1964 34 p refs In POLISH; ENGLISH summary

(CLOR-34)

Radiation protection conditions in radioisotope, laboratories are evaluated. The most important problem was the situation in establishments using radioactive luminous compounds. The prime problem at present is how to minimize exposure of persons working with radium applicators. Author

N65-22614*# National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY

Mar. 1965 145 p refs

(NASA-SP-7011(09)) CFSTI: HC $1.00/MF $1.00

An annotated bibliography covering aerospace medicine and biology entries introduced into the NASA Information System during February 1965 is presented. Included are references from Scientific and Technical Aerospace Reports, American Institute of Aeronautics and Astronautics Technical Information Service, and the Library of Congress. L.S.

N65-22615*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY
Apr. 1965 124 p refs
(NASA-SP-7011(10)) CFSTI: HC $1.00/MF $1.00

An annotated bibliography covering aerospace medicine and biology entries introduced into the NASA Information Service during March 1965 is presented. Included are references from *Scientific and Technical Aerospace Reports, American Institute of Aeronautics and Astronautics Technical Information Service,* and the *Library of Congress.* M.P.G.

N65-22616*# Marquardt Corp., Van Nuys, Calif.
STUDY OF EXTRATERRESTRIAL LIFE DETECTION CONCEPT
G. E. Ellis Dec. 1964 153 p *Its* Rept.-25146
(Contract NASw-810)
(NASA-CR-62003) CFSTI: HC $5.00/MF $1.00

A study was made of the Marbac detector cell concept to evaluate signal response time and level for all major categories of culturable, earth bacteria, including systematic parametric studies of nutrients and environmental factors. Oxidation-reduction potential studies verified that such techniques can be used to detect the presence of bacteria. The use of changes of oxidation-reduction potentials to detect microbial metabolism and growth was demonstrated in various types of microorganism-nutrient systems. The effects of certain primary variables, such as pH, temperature, concentrations and types of microorganisms and nutrients, growth factors, and gaseous environment were investigated for purposes of increasing the extent and rates of changes of oxidation-reduction potentials. Correlations were developed between oxidation-reduction potentials and bacterial counts. The reproducibility of potential readings was within a 20-millivolt range under favorable conditions. A broad spectrum of desert soils was inoculated into trypticase soy broth and potential changes as high as 690 millivolts were obtained. Studies of the effects of miniaturizing the test cells indicated that experimental cells containing 0.4 milliliter of nutrient and microorganisms could be operated to produce essentially the same changes in potential as larger cells containing 31 milliliters of solution and microorganisms. It was shown that various microorganisms can be detected using the anodic polarization method, as a result of their metabolic activities. A discussion of the preliminary developments in this polarographic method is presented.
S.C.W.

N65-22622*# National Aeronautics and Space Administration, Washington, D. C.
ON THE PHARMACOLOGICAL INFLUENCE OF THE KIDNEY FUNCTION [UBER DIE PHARMAKOLOGISCHE BEEINFLUSSUNG DER NIERENFUNKTION]
E. Starkenstein May 1965 4 p Transl. into ENGLISH from Arch. Exptl. Pathol. Pharmakol. (W. Berlin), v. 92, no. 1, 1922 p 2–3
(NASA-TT-F-9340) CFSTI: HC $1.00/MF $0.50

The rate is discussed of excretion of fluids by the kidney in terms of several parameters. The diuretic action of Atophan is exerted renally and not extrarenally as is the case with most other drugs.
Author

N65-22642# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MEDICAL PRACTICE Selected Articles
2 Mar. 1965 18 p refs Transl. into ENGLISH from Vrachebnoye Delo (Kiev), no. 10, 1963 p 111–117
(FTD-TT-64-962/1; AD-612413)

CONTENTS:

1. TO THE VIBRATION-SICKNESS CLINIC A. M. Kakhana p 1–7 refs (See N65-22643 12-04)
2. FUNCTIONAL STATE OF THE CORTEX OF THE SUPRARENAL GLAND IN PATIENTS WITH VIBRATION SICKNESS OF THE SECOND AND THIRD STAGE A. A. Koval'chuk, G. P. Pidpalyy, and A. I. Postnyy p 8–14 refs (See N65-22644 12-04)

N65-22643# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TO THE VIBRATION-SICKNESS CLINIC
A. M. Kakhana *In its* Med. Pract. 2 Mar. 1965 p 1–7 refs (See N65-22642 12-04)

Clinical data on 65 males, subjected to vibration frequencies within the 30- to 250-cps limits, indicated definite changes in the peripheral nervous system and vessels. The character of the pain, the trophic breakdown on the skin of the wrists and of the nails, the secretion disturbances, and the vasomotor disturbances of the Raynaud syndrome type were among the symptoms noted. In the more advanced stages of the vibration sickness phenomena, diencephalous disturbances were observed in the breakdown of neurovascular regulation and metabolic endocrine functions; neurological damage was found in separate craniocerebral nerves in the form of anisocoria, insufficient convergence, and flattening of the nasolabial fold; and neuritis of the hearing nerves, constriction of the arteries, and reduced muscular force were also noted. Individual case histories are given, and brief reference is made to other research findings.
M.G.J.

N65-22644# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FUNCTIONAL STATE OF THE CORTEX OF THE SUPRARENAL GLAND IN PATIENTS WITH VIBRATION SICKNESS OF THE SECOND AND THIRD STAGE
A. A. Koval'chuk, G. P. Pidpalyy, and A. I. Postnyy *In its* Med. Pract. 2 Mar. 1965 p 8–14 refs (See N65-22642 12-04)

Medical histories of 45 miners, who worked with high frequency pneumatic drills, were used in diagnosing stages of vibration sickness. Symptoms of second-stage patients included constant pain, paresthesia, and lowered pain sensitivity in the arms; lowered skin temperature of the fingers down to 22° to 23°; rise in pain sensitivity threshold to 0.8 to 0.9 mm, and functional disturbances of the central nervous system of an astheno-neurotic character. Third-stage victims suffered from constant hand pain, nighttime paresthesia, spastic and spasticoatonic states of the capillaries, lowered pain sensitivity of the chest, thickening of the interphalanx joints, and astheno-neurotic reactions. Analyses of clinical data showed inhibited functioning of the cortex of suprarenal glands, which progressed in proportion to the development of symptoms; this inhibition is apparently due to the development of hypoxemia. Functional reserves of the cortex are preserved in vibration sickness, but lowering is observed in patients subjected to long-term vibration effects.
M.G.J.

N65-22653*# West Virginia Univ., Morgantown. Dept. of Theoretical and Applied Mechanics.
STRAIN RATE SENSITIVITY OF CERTAIN BIOLOGICAL MATERIALS Final Report

J. H. Mc Elhaney and E. F. Byars 1965 108 p refs
(Grant NsG-533)
(NASA-CR-62440) CFSTI: HC $4.00/MF $0.75

A high velocity air gun type testing machine was developed capable of performing constant velocity tests to strain rates of 4000/sec. Adjustable stops provided allow predetermined strains to be applied to miniature specimens. High frequency response instrumentation utilizing a piezoelectric load cell and capacitance displacement transducer was used. Load and displacement histories of fresh bovine femur bone, embalmed human femur bone, bovine tissue, nylon and aluminum were measured over a wide range of strain rates. Results are presented in the form of stress–strain diagrams at selected strain rates. Curves of various properties, as affected by rate of loading, are also provided. A critical velocity was noted for both types of bone in the neighborhood corresponding to a strain rate of 1/sec. A stress, strain, strain rate surface representation of the data is suggested and similarities between the dynamic response of bone, nylon and aluminum are noted. The intersection of this surface with planes parallel to the stress–strain coordinate plane were found to be exponentials. Author

N65-22655# National Aeronautics and Space Council, Washington, D. C.
SOVIET BIOASTRONAUTICS—1964
Eugene B. Konecci [1964] 10 p refs Presented to the Natl. Space Club, Washington, 15 Dec. 1964

Dr. Eugene B. Konecci, the National Aeronautics and Space Council, describes the development and results of the Russian bioastronautic research and manned space flights. The shirtsleeve environment and the mixed interdisciplinary crew capability of their space capsules offer a great potential for many investigations on man. The author does not believe that the Soviets will attempt manned extravehicular experiments until (1) they have developed a better space suit; (2) they have a better fix on the possible decompression sickness problems of decompressing from a sea-level atmosphere with nitrogen to a compatible space suit environment; and (3) the Gemini intentional decompression and extravehicular experiments have taken place. The importance of a more extensive free exchange of scientific information particularly in the bioastronautics field is pointed out. G.G.

N65-22678# Texas Technological Coll., Lubbock. School of Engineering
INVESTIGATION INTO THE EFFECT OF INTERMITTENT NOISE OF CONSTANT PERIODICITY VS. RANDOM PERIODICITY ON THE PERFORMANCE OF AN INDUSTRIAL TASK
Nevin E. Fornwalt (M.S. Thesis) May 1965 120 p refs
(Contract AF 33(608)-1119)
(AD-611788)

An investigation of the effect of noise of varying periodicity of presentation on the performance of a task involving a sensorimotor factor and a simple-decision factor was performed. The following conclusions regarding this experiment were made: The trial's main effect was significant in the analyses of all dependent variables, indicating that a considerable amount of learning took place over the duration of the experimental testing. The main effect of sex was significant in all analyses except that of wrong switches. The effect of noise periodicity of the performance of the experimental task was significant in the analysis of wrong switches. Interactions involving noise type indicated that the random noise produced greater deleterious effects on performance than periodic noise, and that both types of intermittent noise had greater adverse effects on performance than continuous noise. Noise intensity did not have a significant main effect in any of the analyses. The 70-dB intensity generally produced the most deleterious effects in males; whereas, the 82-dB intensity had this effect on females. Findings regarding age indicated that the younger age group's latencies were predominantly in the late category; whereas those of the older group were evenly divided between the early and late categories. TAB

N65-22723 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION OF MOVEMENT COORDINATION WHEN WRITING UNDER CONDITIONS OF SPACE FLIGHT
A. I. Mantsvetova, I. P. Neumyvakin, V. F. Orlova, V. A. Trubnikova, and I. M. Freydberg *In its* Cosmic Res., Vol. 3, No. 2, 1965 1 Apr. 1965 p 228–255 refs (See N65-22713 12-30)

This article discusses results from investigations of the coordination of movement in writing, on the basis of astronauts' entries in the logs of space vehicles. The materials of the cited investigations made it possible to note changes in the coordination of movements throughout the course of a space flight. The coordination of movements was characterized by variations in handwriting, reflecting specific features of movement during writing, as well as by the changes which occurred under the influence of the various external and internal conditions under which the subject texts were being prepared. Author

N65-22724 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
REACTION OF IRRADIATED ORGANISM WHEN AFFECTED BY ACCELERATION OF CRITICAL MAGNITUDE
B. I. Davydov, V. V. Antipov, and P. P. Saksonov *In its* Cosmic Res., Vol. 3, No. 2, 1965 1 Apr. 1965 p 256–268 refs (See N65-22713 12-30)

Results are presented on experiments designed to study the tolerance of accelerations of critical magnitude (40 to 42 g) in animals irradiated with doses of 250 to 850 R. In comparison with the control test, elevated resistance on the part of the irradiated animals to acceleration is observed. An attempt is made to extrapolate the derived experimental data from animals to humans. Author

N65-22728# Joint Publications Research Service, Washington, D. C.
RECENT DEVELOPMENTS IN SOVIET MEDICINE
27 Apr. 1965 63 p refs Transl. into ENGLISH from Clin. Med. (USSR), v. 43, no. 1, Jan. 1965 p 11–27, 95–100
(JPRS-29788, TT-65-30834) CFSTI: $3.00

CONTENTS:

1. CONTEMPORARY PROBLEMS OF MEDICAL SCIENCE (XX SESSION OF THE GENERAL MEETING OF THE ACADEMY OF MEDICAL SCIENCES OF THE USSR) V. Kh. Vasilenko and M. A. Zhukovskiy p 1–13
2. DIAGNOSTICS AND CYBERNETICS L. B. Naumov p 14–30 (See N65-22729 12-04)
3. GAS EXCHANGE DURING RADIATION SICKNESS N. A. Kurshakov and S. F. Seberin p 31–52 (See N65-22730 12-04)
4. ON PHYSIOLOGICAL SHIFTS IN THE ORGANISM OF HEALTHY PERSONS IN THE ARCTIC V. A. Popov p 53–59 (See N65-22731 12-04)

N65-22729 Joint Publications Research Service, Washington, D. C.

DIAGNOSTICS AND CYBERNETICS

L. B. Naumov *In its* Recent Develop. in Soviet Med. 27 Apr. 1965 p 14-30 Presented at the Sverdlovsk Soc. of Roentgenol., 9 Feb. 1963 (See N65-22728 12-04) CFSTI: $3.00

Experiments in the practical use of the electronic computer for positive identification of roentgenologically similar diseases of the lungs are discussed. Also, the simplest forms of cybernetic diagnostics when the electronic computer is a component of the man-machine system is considered. Further, the possibility of the use of cybernetics for diagnostically deciphering any recordings, and execution by the electronic computer of unproductive and labor consuming work of the physician, including work fraught with the possibility of particular diagnostic errors is discussed. It is expected that diagnostically used cybernetics will appear most promising where symptomatic information is objectively fixed and not dependent on the skill of the physician. Thus in reoentgenological diagnostics, the most expedient use of cybernetics is in pulmonology and osteology. Here the picture itself has complete symptomatic information. The use of the electronic computer in X-ray diagnostics of diseases of the digestive tract is less practical. E.E.B.

N65-22730 Joint Publications Research Service, Washington, D. C.

GAS EXCHANGE DURING RADIATION SICKNESS

N. A. Kurshakov and S. F. Seberin *In its* Recent Develop. in Soviet Med. 27 Apr. 1965 p 31-52 (See N65-22728 12-04) CFSTI: $3.00

Changes in the gas composition of the blood during acute and chronic radiation sickness are discussed. Development of anemia during the acute and chronic course of the disease leads to a decrease of the oxygen reserves of the blood and to anemia hypoxia in the period of acute clinical manifestations. The lowering of the oxygen reserves of the blood is caused not only by the decreased quantity of hemoglobin in the blood but also by the lowered ability of the hemoglobin to combine with oxygen. E.E.B.

N65-22731 Joint Publications Research Service, Washington, D. C.

ON PHYSIOLOGICAL SHIFTS IN THE ORGANISM OF HEALTHY PERSONS IN THE ARCTIC

V. A. Popov *In its* Recent Develop. in Soviet Med. 27 Apr. 1965 p 53-59 (See N65-22728 12-04) CFSTI: $3.00

The deficiency of vitamin C, the functional state of the liver, composition of peripheral blood, and the state of the cardiovascular system for individuals living in the Arctic are discussed. Shifts in the human body are caused by the high stress, hypovitaminosis, and lack of light in the Arctic. From studied functions of the liver, the earliest and most strongly expressed ability of this organ is the adjustment to the colloidal state of the proteins of the blood serum and to pigmentation. The most essential changes in the peripheral blood are the inclination to leucopenia, eosinopenia, and monocytopenia. Also, low indices of the erythrocyte sedimentation rate were noted. For healthy persons a tendency to hypotonia was four and one-half times more frequent than to the hypertonic state. Further; high instability of pulse and arterial pressure was noted. E.E.B.

N65-22733 Walter Reed Army Inst. of Research, Washington, D. C.

MEDICAL TRENDS IN LIFE SUPPORT SYSTEMS

Timothy G. Barila *In* Army Dept. Army Sci. Conf. Proc., Vol. I [1964] p 1-7 (See N65-22732 12-34)

Support of life during stressful situations is discussed. Frequently, death due to cardiac arrest appears premature in the sense that the organ gives little evidence of damage; such deaths can be (and frequently are) reversed by prompt attention. Revival of the heart by electrical impulse, direct massage, or combination of chest pressure and mouth-to-mouth breathing, is an indication that support of life under stress may often be possible. When stress damage is drawn out in time, organ transplant or artificial organs can be the means of affecting reversal of death. Experiments with a small artificial heart pump which was used to provide dogs with a pulsating blood flow for 2 hours suggest that it may be possible to develop miniaturized organ replacements for extended use in victims who might not otherwise be saved. J.M.D.

N65-22747 Army Biological Labs., Fort Detrick, Md.

A MECHANISM OF ACTION OF STAPHYLOCOCCAL ENTEROTOXIN POISONING

Gerald J. Crawley, John N. Black, Irving Gray, and Wayne A. Leblang *In* Army Dept. Army Sci. Conf. Proc., Vol. I [1964] p 207-220 refs (See N65-22732 12-34)

The distribution of, and physiological response to staphylococcal enterotoxin was followed in several species of animals. Symptomatology, disappearance times, methods used, and results from blood binding, tissue distribution and body space studies are discussed. Although no information concerning the possible role of the central nervous system in the pathogenesis of acute staphylococcal toxin reactions resulted, the studies suggested the following: (1) The toxin is bound initially to white blood counts (WBC) and albumin. (2) Toxin-bound WBC's are trapped in the lungs. (3) The lungs develop increased weight due to interstitial fluid accumulation which occurs with loss of vascular fluid, but with unchanged total body water, intracellular water, and extracellular fluid. (4) Rechallenged and resistant animals react differently as evidenced by an early increased accumulation of toxin in the liver, and an increased clearance of toxin free of protein by the kidney and thyroid. M.G.J.

N65-22761 Army Biological Labs., Fort Detrick, Md.

THE EFFECT OF HYPERTHERMIA ON PROTEIN TURNOVER IN INFECTION

Irving Gray and Paul V. Hildebrandt *In* Army Dept. Army Sci. Conf. Proc., Vol. I [1965] p 405-411 refs (See N65-22732 12-34)

Protein metabolism has been followed in control, hyperthermia and hyperthermia plus virus. Breakdown is increased in both experimental groups over that in the control group. It is concluded that this increase, caused primarily by the fever, contributed to the previously observed increased nitrogen excretion. Evidence is presented to support the concept that protein synthesis is stimulated by the presence of virus at a time simultaneous with that of the observed protein breakdown. Author

N65-22762 Walter Reed Army Inst. of Research, Washington, D. C.

MOLECULAR MECHANISMS OF ANTIMICROBIAL ACTION

Fred E. Hahn *In* Army Dept. Army Sci. Conf. Proc., Vol. I [1964] p 413-426 refs (See N65-22732 12-34)

Antibiotics were found to inhibit (1) cell wall synthesis (penicillin), (2) protein synthesis (chloramphenicol, tetracyclines, streptomycin, erythromycin), (3) RNA synthesis, and (4) DNA synthesis. Mechanisms by which these effects are produced

were studied and typical results of this research are reported. Chloramphenicol and erythromycin appear to inhibit protein biosynthesis by direct interaction with ribosomes. In all instances, the antimicrobial actions occurred in the general area of macromolecular biosynthesis and assemblage. Author

N65-22763 Walter Reed Army Inst. of Research, Washington, D. C.
INFLUENCE OF TRAUMA AND HEMOLYSIS ON HEMORRHAGIC SHOCK IN DOGS
Robert M. Hardaway, III *In* Army Dept. Army Sci. Conf. Proc., Vol. I [1964] p 427–440 refs (See N65-22732 12-34)

The paper reports results of experiments to assess the role of hemolysis in hemorrhagic shock. A small amount of endogenous hemolyzed blood causes an increase in mortality of dogs in hemorrhagic shock from 13% to 91% due to the stimulation by hemolyzed blood of disseminated intravascular coagulation (DIC), which is also stimulated by hemorrhage and shock. The lethal factor is a clotting factor in the red cell. Hemolyzed blood, harmless alone, is lethal in the presence of shock. Hemolyzed blood causes conversion of fibrinogen to fibrin. Fibrinolysin prevents death in irreversible hemorrhagic shock both as produced by hemorrhage alone and as influenced by hemolyzed blood. Endogenous heparin is stimulated by DIC which is produced either by hemorrhage alone, hemolyzed blood alone, or a combination of both. A prolonged silicone clotting time during hemorrhagic shock prognosticates irreversibility. Irreversibility is correlated with a fibrinogen fall caused by consumption in DIC. Central venous pressure is not elevated even though the shock is irreversible. Irreversibility is due to an episode of DIC. Author

N65-22800# Atomic Energy Commission, New York. Environmental Studies Div.
HEALTH AND SAFETY LABORATORY FALLOUT PROGRAM Quarterly Summary Report, Dec. 1, 1964–Mar. 1, 1965
Edward P. Hardy, Jr. and Joseph Rivera 1 Apr. 1965 330 p refs
(HASL-158) CFSTI: $4.00

CONTENTS:

1. HASL FALLOUT PROGRAM DATA AND DATA FROM OTHER SOURCES p 1–272 refs
2. INTERLABORATORY CALIBRATION PROGRAM—1964 P. W. Krey p 273–277
3. ANALYSES OF INTERLABORATORY COMPARISON SAMPLES, BLIND DUPLICATES AND BLANKS AT HASL AND OTHER LABORATORIES FROM SEPTEMBER 1963–DECEMBER 1964 E. P. Hardy, Jr. p 278–294 refs
4. FALLOUT IN THE ATLANTIC OCEAN H. L. Volchok and M. T. Kleinman p 295–299 refs
5. STATISTICAL VARIATION OF THE EQUIVALENCE OF POT AND ION EXCHANGE COLUMN Sr-90 SAMPLES L. D. Y. Ong and Frances K. Durkan p 300–306
6. DIETARY INTAKES AND BODY BURDENS OF Cs-137 J. Rivera p 306–309 refs
7. THE EARLY STRATOSPHERIC DISTRIBUTION OF DEBRIS FROM A SNAP 9A ABORT L. P. Salter p 310–324 refs (See N65-22801 12-13)

N65-22801 Atomic Energy Commission, New York. Environmental Studies Div.
THE EARLY STRATOSPHERIC DISTRIBUTION OF DEBRIS FROM A SNAP-9A ABORT
L. P. Salter *In its* Health and Safety Lab. Fallout Program 1 Apr. 1965 p 310–324 refs (See N65-22800 12-13) CFSTI: $4.00

Recent measurements of plutonium isotopes by high-altitude balloon program filter papers were used to establish a distribution pattern for the SNAP-9A debris from the burnup of 17 kilocuries of Pu-238 in the upper stratosphere of the Southern Hemisphere. The first debris was found in August 1964 at 108 kilofeet, 34° S latitude, and descended subsequently to 80 kilofeet in January 1965, at which time the material was also detectable in the highest altitudes of the Northern Hemisphere. The concentration profile for SNAP-9A Pu-238 is presented in a table, and a comparison with the Cd-109 production of the high-altitude Starfish Prime plutonium probe of July 9, 1962 is given. In this latter probe Cd-109 was produced and has served as tracer for debris. Quantitative differences between the Pu-238 and the Cd-109 data suggest that the relative concentrations of SNAP-9A debris are about a factor of five greater. These differences are attributed to a lower yield or escape of Cd-109, and to variations in location, season, and stratospheric motion. G.G.

N65-22808# Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Sciences
A PROBABILISTIC MODEL FOR FREE-RESPONDING Technical Report No. 67
M Frank Norman (Ph.D. Thesis) 14 Dec. 1964 100 p refs (Grant AF-AFOSR-62-384)
(AFOSR-65-0288; AD-611163)

An animal behavior model is presented which describes time between responses in situations where response can be repeated at will. Examples of such situations involve rats or pigeons in a cage with a lever apparatus which (when triggered) produces a food reward for the animal. Mathematical properties of the model are investigated, and an asymptotic form of the probability distribution of interresponse time is derived. The model is applied to experimental data for comparison of observed and predicted mean interresponse times. It is established that interresponse time densities need not decrease monotonically with increasing length of interresponse time. J.M.D.

N65-22844# Max-Planck-Institut für Biophysik, Frankfurt am Main (West Germany).
RADIATION EFFECTS ON LIVING TISSUES AND ORGANISMS. SERIES C: BIBLIOGRAPHIES
W. Stahlhofen, comp. AED Information Service, 1965 176 p refs
(AED-C-04-16)

A bibliography of various studies pertaining to the radiation effects on living tissues and organisms for the years 1962 and 1963 is presented. The 540 publications are recorded on IBM punch cards and numbered for easy retrieval so that the research information is readily available to interested research and industrial centers in Germany. G.G.

N65-22869# Autonetics, Anaheim, Calif. Human Factors Dept.
LABORATORY STUDIES IN AIR-TO-GROUND TARGET RECOGNITION. II: THE EFFECT OF TV CAMERA FIELD OF VIEW
G. Rusis and H. L. Snyder 4 Mar. 1965 31 p refs
(T5-133/3111)

A laboratory simulation experiment was performed to determine the effect of the TV camera lens field of view upon

air-to-ground target recognition by closed-circuit television. Measures of performance were probability of correct target recognition, range of correct recognition, and numbers of errors committed. It was found that, as the field of view decreased, probability of correct recognition decreased, range of correct recognition increased, incorrect target recognitions did not vary, and number of no-response targets increased. The results were discussed in terms of their applicability to tactical airborne situations. Author

N65-22870# Autonetics, Anaheim, Calif. Human Factors Research

LABORATORY STUDIES IN AIR-TO-GROUND TARGET RECOGNITION. III: THE EFFECTS OF AIRCRAFT SPEED AND TIME-TO-GO INFORMATION

G. Rusis and R. L. Calhoun 10 Mar. 1965 28 p refs
(T5-134/3111)

An experiment was performed to assess the effects of time-to-go information and aircraft speed upon probability of correct target recognition, range of correct recognition, and errors committed. The ground speeds simulated were 198 and 792 knots. Time-to-go information, when provided, was in the form of a verbal tape recorded time countdown to the target. Performance was better at low than at high speeds. Providing the subjects with time-to-go information resulted in an increased probability of target recognition and in a decreased number of no-response targets; it had no effect upon range of recognition or percent of incorrect recognition. Author

N65-22877 Joint Publications Research Service, Washington, D. C.

LIMITING FREQUENCIES WITH RESPECT TO ABSORPTION

In Its Optimum Working Freq. in Short-Wave Commun. 19 Apr. 1965 p 2–16 refs (See N65-22875 12-07) CFSTI: $1.00

Calculations on the limitations of short-wave radiofrequencies with respect to absorption are presented for radio tracks of varying latitudes. It was found that the limiting frequency for their transmittal is the least frequency at which radio communications are still possible at the given power of the transmitter over the given distance. Comparison of the calculated values with experimental values from a radio track at midlatitude showed good agreement. The apparent increase of absorption by day and its decrease during nighttime are associated with the ultraviolet radiation of the sun which is at its maximum at noon. Experiments and calculations of the limiting frequencies with respect to absorption for higher latitudes established a nighttime maximum caused by the corpuscular radiation of the sun and a daytime maximum associated with the ultraviolet radiation. Both in mid- and high-latitudes the absorption depends strongly upon the radiation power used for transmission. G.G.

N65-22889# Naval School of Aviation Medicine, Pensacola, Fla.

REVIEW OF MOTION SICKNESS DRUGS FROM 1954–1964
Special Report No. 64-2

Charles D. Wood (Arkansas Univ.) 10 Dec. 1964 16 p refs
(AD-611394)

The problem: The great increase in air and sea travel has resulted in a greater need for effective antimotion sickness drugs, and the exploration of space is expected to intensify this need. Since a review of available antimotion sickness drugs has not been published since 1955, a compilation of the newer drugs and studies reported in the last 10 years is presented. Findings: Hyoscine (scopolamine) still appears to be one of our most effective antimotion sickness drugs. Its severe side effects of drowsiness, vertigo, and dry mouth limit its usefulness. Meclizine (bonamine) and cyclizine (marezine) are reported to be the most effective of the antihistamines. Their side effects are milder than most other preparations, and their level of reported effectiveness approaches that of hyoscine. TAB

N65-22946# Indiana Univ., Bloomington.

EFFECTS OF VARIATION IN VISUAL AND AUDITORY STIMULATION ON GASTROINTESTINAL MOTILITY

Robert M. Stern Jan. 1964 12 p refs
(Contract DA-49-193-MD-2063)
(TR-12; AD-610180)

The short-term effects of variation in visual and auditory stimulation on gastrointestinal motility were studied. Two experiments were conducted using male students (Ss) who were exposed to the following conditions: (A) sensory reduction (no visual or auditory stimulation); (B) unrestricted vision and a constant low auditory input; and (C) constant, low auditory input and restricted visual input (unpatterned stimulation). A hypothesis stating that gastrointestinal motility would decrease in all groups during a 40-minute experimental period, but that the group receiving diffuse visual stimulation would show the slowest rate of change, was tested. Gastrointestinal motility, recorded on a specially designed apparatus, was defined in terms of the amplitude component of the recordings, and measured at 1-minute intervals. Results support the hypothesis that gastrointestinal motility recorded from Ss in condition (C) would be greater than that recorded from the other two groups. All three groups showed adaptation over time, group (C) showing the slowest rate of change. Increase in gastrointestinal activity for group (C) is attributed to the novelty and ambiguity of the stimulus situation. S.C.W.

N65-22947# Indiana Univ., Bloomington.

EFFECTS OF CONTRAST IN STIMULATION ON GASTROINTESTINAL MOTILITY

Robert M. Stern Jul. 1964 12 p refs
(Contract DA-49-193-MD-2063)
(TR-14; AD-610181)

The effects of contrasting levels of stimulation on gastrointestinal response was studied. Two groups of male students were subjected to high and low levels of stimulation. It was hypothesized that a change to a moderate level of stimulation would result in a decrease in gastrointestinal motility below baseline level for a group that was responding at a high level to high stimulation, and an increase in level of responding for a group that was responding at a previously low level to low stimulation. The validity of this hypothesis was established. The significance of reversal activity in the gastrointestinal system was also studied. It was further hypothesized that the relative mean amplitude of gastrointestinal motility would reverse if the system reacted in a manner similar to other autonomically innervated systems. It was found that in the gastrointestinal system, any change in stimulation is activating for 2 to 3 minutes regardless of the direction of change, and that it is not until this initial effect of the abrupt change dissipates that the contrast effect can be seen. In autonomic systems however, there is an immediate reversal in relative level of responding with change in level of stimulation. S.C.W.

N65-22949# Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.

STRUCTURAL CHANGE IN SMALL ISOLATED GROUPS

Paul D. Nelson [1963] 10 p refs
(Rept.-64-24; AD-609543)

Men who had spent 12 months at one of three Antarctic research stations (N ranging from 17 to 33) provided information at two time periods concerning work, formal communication, and off-duty friendship interactions. The purpose was to ascertain the extent to which group structure changed in any of these three domains of interaction over a 6-month period. From an analysis of direct, indirect, and reciprocal choices there were no general change patterns common to all station groups or all types of interaction. Author

N65-22964# Osterreichische Studiengesellschaft für Atomenergie G.m.b.H., Seibersdorf (Austria). Institut für Biologie und Landwirtschaft

THE CHANGING OF PRONOUNCED TECHNOLOGICAL TRAITS OF INDUSTRIAL YEAST DUE TO ^{60}Co RADIATION [VERANDERUNG TECHNOLOGISCHER CHARAKTERISTIKA VON BETRIEBSHEFE DURCH ^{60}Co-BESTRAHLUNG]

K. Prosenz, H. Gaisch, and K. Kaindl [1964] 17 p refs In GERMAN Submitted for Publication
(SGAE-BL-12/1964)

Irradiation of industrial yeast in brewer's wort by a Co^{60} source producing 78 600 rad/h ±225 rad for 0.6 to 1.3 MeV was investigated for its effects on (1) degree of fermentation; (2) pH behavior; (3) CO_2 production; (4) final degree of fermentation; (5) acidity; (6) alcohol production; (7) yeast quantity; (8) fragmentation ability; and (9) residual sugar. All observed parameters showed stimulation at 0.05 Mrad, and inhibition and slowing down at increased radiation dosage. The observed activities at low gamma radiation could be utilized for higher yeast and alcohol production. Transl. by G.G.

N65-22968*# National Aeronautics and Space Administration, Washington, D. C.

BIBLIOGRAPHIC INDEX TO LITERATURE ON AEROSPACE MEDICINE AND BIOASTRONAUTICS PUBLISHED IN THE USSR (1962–1964) [BIBLIOGRAFICHESKIY UKAZATEL' LITERATURY PO AVIAKOSMICHESKOY MEDITSINE I BIOASTRONAVTIKE, IZDANNOY V SSSR (1962–1964)]

L. I. Boreva and E. M. Zavodovskaya, comp. May 1965 69 p refs Transl. into ENGLISH of the paper presented at the 15th Intern. Astronautical Congr., Warsaw, 7–12 Sep. 1964
(NASA-TT-F-270) CFSTI: HC $3.00/MF $0.75

This bibliographic index includes the basic scientific publications in the areas of space medicine and bioastronautics published in the U.S.S.R. from 1962 to 1964. It encompasses studies in *General Problems of Space Biology and Aerospace Medicine; Experimental Investigations on Spacecraft Satellites, High-Altitude Geophysical Rockets and Aircraft; Results of Laboratory Investigations with Simulation of the Effects of Space Flight Factors; Methodology; Experimental Investigations on Spacecraft Satellites, High-Altitude Geophysical Rockets, Aircraft and in Parachute Jumps;* and *Question of Evaluation, Selection and Preparation of Flight Crews.* G.G.

N65-22984# California Univ., Livermore. Lawrence Radiation Lab.

GAMMA DOSE RATES AND INTEGRATED DOSES FROM NEUTRON-INDUCED RESIDUAL RADIOACTIVITY IN SOIL

R. M. Lessler and F. W. Guy 1 Mar. 1965 54 p refs
(Contract W-7405-ENG-48)
(UCRL-12339, Vol. I) CFSTI: $3.00

Gamma dose rates and integrated doses above the soil resulting from neutron activation of the soil by a nuclear explosion were calculated for various times after burst for several different initial neutron energies, heights of burst, soils, and atmospheric conditions. Methods of calculation are described and results presented. Examples are given of extrapolation of the results to situations not specifically covered in the data. Author

N65-22992# Rochester Univ., N. Y. Div. of Radiology and Biophysics

THE RETENTION OF STRONTIUM-90 BY FETAL AND NEWBORN RATS

B. J. Hopkins, R. C. Baxter, and L. W. Tuttle 29 Mar. 1965 17 p refs
(Contract W-7401-ENG-49)
(UR-661)

The effect of dose size, maternal age at conception, and gestational age at the time of injection upon the retention of strontium in rat fetuses and newborn was investigated. Examination of the offspring from 60 pregnant females of the Long–Evans strain injected with Sr^{90} showed that the fraction of the dose retained by the developing fetus or newborn was not influenced markedly by the size of the dose injected to the dam over the range of 24 to 382 microcuries. When 191 or 382 microcuries was injected to the dam on the second day postconception, 0.05% and 0.04% of the dose was retained, respectively, by the litter on the 20th day postconception. The percentage retained was similar when doses were injected on the tenth day postconception. The percentage retained in the litter at parturition following injection on the 17th day postconception was 3.5%, 4.0% and 3.9% of total doses of 24, 191 or 382 microcuries of strontium-90, respectively. The dose fraction retained by the newborn was greatly influenced by the gestational age at the time of injection to the mother. Author

N65-23002*# Northrop Space Labs., Hawthorne.

INVESTIGATION OF *PEROGNATHUS* AS AN EXPERIMENTAL ORGANISM FOR RESEARCH IN SPACE BIOLOGY
Progress Report, 1 Jan.–31 Mar. 1965

J. J. Gambino and R. G. Lindberg [1965] 30 p refs
(Contract NASw-812)
(NASA-CR-62556; NSL-64-29-6) CFSTI: HC $2.00/MF $0.50

It was proved possible to breed *Perognathus longimembris* in captivity. Yield per unit effort is quite low at the present state of the art; a renewed effort to obtain breeding in litter mates is indicated. That litter mates have been kept together for long periods without mortality suggests their antagonistic behavior patterns may be altered. With new knowledge of how to predict receptivity in females and to produce sexually active males, this may be successful. Author

N65-23007# North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.

MAN AND MISSION SUCCESS

D. Amorelli, B. G. Peters, and J. T. Celentano 7 Feb. 1964 34 p refs Presented at 1964 SAE–ASME–AIAA–Aerospace Reliability and Maintainability Conf., Washington, D. C., 29 Jun.–1 Jul. 1964
(Rept.-546-M; AD-457785)

This paper discusses a concept of reliability, which includes the relationship of man to total system reliability, and the techniques and controls used to insure spacecraft mission success through reliability. Former maintainability concepts

for weapon systems are reviewed. Their inadequacies for manned spacecraft are indicated. The reliability concepts for manned spacecraft, which require that all systems function during a mission, are examined. Examples of man's contribution to the reliability of aircraft and spacecraft systems are discussed. These concepts will permit achievement of mission success that approaches 100%, using hardware with a reliability of 80%. The method for integrating reliability concepts, step by step, into design analysis and review is discussed as is the subsequent extension into test and redesign activities. The method for integrating man into the space system reveals his ability to manually override, maintain, and repair. This upgrades reliability and provides the means to assure mission success. Author

N65-23037# RAND Corp., Santa Monica, Calif.
FLUID BALANCE AND ELECTROLYTE DISTRIBUTION IN THE HUMAN BODY
Edward DeLand and Gilbert B. Bradham Feb. 1965 121 p refs (Contract AF 49(638)-700; Proj. RAND)
(RM-4347-PR; AD-611818)

A conceptual model and a mathematical method for computing the physiological fluid and electrolyte distribution for selected body compartments of an average, young, 70-kilogram human male are presented. The mathematical procedure simulates the physiological subsystems by incorporating all the known chemical reactions and electrochemical relations which seem necessary to establish the fluid and electrolyte distribution. The construction of the model and the mathematical background is given in heuristic form only. However, considerable detail is shown regarding the analysis of the computed results for a standard, steady-state, average, young, resting, 70-kg human male. Finally, the results of validation experiments, consisting of chemical stresses applied to the model, are discussed. The results of these experiments indicate that the model is a valid supplementary tool for research in the clinical and the research laboratory as well as in theoretical physiology. Author

N65-23052# Joint Publications Research Service, Washington, D. C.
REPARATIVE REGENERATION OF TISSUE UNDER THE EFFECT OF IONIZING RADIATION
V. P. Mikhaylov 4 May 1965 23 p refs Transl. into ENGLISH from Arkh. Anat., Gistol. i Embriol. (Leningrad), v. 48, no. 2, Feb. 1965 p 3-16
(JPRS-29904; TT-65-30894) CFSTI: $1.00

Reparative regeneration of various tissues of white mice and rabbits following single whole-body X-radiation and single local irradiation was investigated. The regenerative process (developing at the peak of acute radiation sickness) proceeded in irradiated animals as it did in the controls. However, in the irradiated animals there was a higher incidence and extent of hemorrhaging and a weaker inflammatory response. In some animals bacterial colonies were detected on the surface, in the depth of the wound, and in the underlying tissue. It was agreed that inhibition of reparative regeneration of tissues in acute radiation disease (where this does occur) was not directly due to weakening of the proliferative capacity of a given tissue caused by ionizing radiation, but rather to functional disruptions of the whole organism and related complications. R.W.H.

N65-23053# Joint Publications Research Service, Washington, D. C.
SPACE MEDICINE RESEARCH DURING THE FLIGHT OF THE "VOSKHOD"
A. V. Lebedinskiy and Yu. G. Nefedov 4 May 1965 8 p Transl. into ENGLISH from Zdorov'ye (Moscow), no. 1, Jan. 1965 p 7-8
(JPRS-29911, TT-65-30900) CFSTI: $1.00

Because a physician, B. B. Yegorov, was included in the three-man Voskhod flight, instrument methods of medical research were combined with actual observation of the condition of the cosmonauts. The flight demonstrated that older men who had undergone shorter training periods could perform satisfactorily during spaceflight. The medical problems associated with radiation and weightlessness are reviewed generally. This Voskhod flight is considered a beginning step in studying the complex factors involved in biological compatibility of space crew members. M.P.G.

N65-23082# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
AN EVALUATION OF PROPOSED APPLICATIONS OF REMOTE HANDLING IN SPACE
Gerald P. Chubb Oct. 1964 16 p refs Presented at the Symp. on Remotely Operated Spec. Equipment (Proj. Rose) AEC, Germantown, Md., 26-27 May 1964
(AMRL-TR-64-98, AD-608802)

This report discusses problems of applying remote handling techniques to assembly and maintenance operations in space. Some of the methodological problems are pointed out and current conceptions of remote handling in space are evaluated. Areas where more research is required are pointed out. Remote handling systems based on the state of the art are feasible, but may not be adequate for all proposed tasks, and certainly not all are optimal or efficient. Author

N65-23083# Rome Air Development Center, Griffiss AFB, N. Y.
PHOTOINTERPRETER PERFORMANCE STUDIES
Shelton Mac Leod Sep. 1964 61 p refs
(RADC-TDR-64-326; AD-609071)

This report is a summary of five studies designed to explore important relationships between measures of photointerpreter performance and the following types of antecedent factors: (1) image quality; (2) mode of presenting comparative-cover photography; (3) techniques for rapid recognition training; (4) temporal aspects (viewing time and work-rest cycles) of image presentation; and (5) image content parameters. Each study is reviewed with respect to experimental objectives, approaches, results and conclusions. Immediate applications of the data and implications for future research are also discussed. Author

N65-23085# Bell Aerosystems Co., Buffalo, N. Y.
PRELIMINARY INVESTIGATION OF TRAINING REQUIREMENTS FOR AIR CUSHION VEHICLE (ACV) OPERATORS
R. Flexman and G. S. Malecki Port Washington, N. Y., Naval Training Device Center, Aug. 1964 146 p refs
(Contract N61339-1557)
(NAVTRADEVCEN; AD-609364)

The operator training requirements for air cushion vehicles were investigated, with the various subsystem functions and operations of the respective design configurations considered. It was felt that the existence of many common vehicle characteristics permits useful predictions of operator task requirements, training equipment needs, and the definition of areas of further analysis and applied research. The following study areas are discussed: *Description of Air Cushion Vehicles; Identification of ACV Applications; Description of ACV Controls and Displays; Identification of Natural and Induced Environmental*

Factors; Operator Task Description for Bell SK-3 Caraboa and U.S. Navy Hydroskimmer; Description of Handling Characteristics and Techniques for U.S. Navy Hydroskimmer; Estimation of Skill and Training Requirements; and *Recommendations for Further Research.* G.G.

N65-23105# Rochester Univ., N. Y. Medical Div.
CHANGES IN KINETICS OF ERYTHROPOIESIS AS REFLECTED IN FREQUENCY DISTRIBUTION OF ERYTHROCYTE VOLUMES OF ACUTELY BLED DOGS
G. F. Orthey and M. Ingram 22 Mar. 1965 37 p refs
(Contract W-7401-ENG-49)
(UR-662)

A study of the frequency distribution of erythrocyte volumes in normal and acutely bled dogs is described. Cell volumes were measured and graphed with a model B Coulter counter with size distribution plotter. Size distribution of erythrocytes of different ages were evaluated by obtaining frequency distribution graphs (histograms) for various fractions of a centrifuged column of red cells. The normal dog is shown to have a bimodal distribution of erythrocyte volumes, and the cell volume distribution curves of both newly formed and old erythrocytes are virtually identical. The dogs that were studied responded to acute blood loss by producing abnormally sized erythrocytes as well as by marked acceleration of red blood corpuscle (rbc) production. Data are presented to show that the two populations of rbc normally present may vary independently in response to erythropoietic stress. The observations reported are interpreted in light of Lajtha's model for erythropoiesis. Author

N65-23144# Joint Publications Research Service, Washington, D. C.
ON THE ESSENCE OF LIFE
G. M. Frank et al 3 May 1965 360 p refs Transl. into ENGLISH of a book "O Sushchnosti Zhizni" Moscow, "Nauka" Publishing House, 1964 p 1–351
(JPRS-29864; TT-65-30878) CFSTI: $7.00

CONTENTS:

N65-23145# Joint Publications Research Service, Washington, D. C.
STUDIES ON THE TOXICITY OF AEROSOL AND ALIPHATIC AMINES ON INDUSTRIAL PREMISES
4 May 1965 21 p refs Transl. into ENGLISH from Gigiena Truda i Prof. Zabolevaniya (Moscow), no. 12, 1964 21 p
(JPRS-29913; TT-65-30902) CFSTI: $1.00

CONTENTS:

N65-23152# Lockheed-California Co., Burbank. Rye Canyon Research Center
INSTRUMENTATION TECHNIQUES FOR ANALYSIS OF CHARACTERISTICS OF ANIMAL SONAR PULSES
John J. Dreher, William W. Sutherland, and William E. Evans
14 Jan. 1965 49 p ref
(Contract Nonr-3680(00))
(LR-18525; AD-610880)

The following conclusions are offered: (1) The demonstrated effects of inhomogeneities of the transmission medium on airborne pulses, analogous to the inhomogeneities of sea water, probably relegate the active sonar signature of a water immersed target to a statistical description, i.e., single-pulse returns will evidence variations that must be detected by multiple samples. (2) The survival history and recently demonstrated target performance of several marine mammals strongly indicates their use of rapidly repeated pulses to utilize a "pulse phoneme" principle. (3) The observable and measurable differences in some physical parameters of marine mammal sonar pulses suggest functional specificity related in some fashion to the biological needs and capabilities of a particular genus. (4) Zalophus appears to produce pulses of much narrower bandwidth than do cetacea. (5) The use of certain analysis methods outlined above may reveal classification techniques for relating functional behavior of cetacea on the basis of their echo-location mechanisms. TAB

N65-23166*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EVALUATION OF PILOT'S ABILITY TO STABILIZE A FLEXIBLE LAUNCH VEHICLE DURING FIRST-STAGE BOOST
Gordon H. Hardy, James V. West, and Robert W. Gunderson
Washington, NASA, May 1965 61 p refs
(NASA-TN-D-2807) CFSTI: HC $3.00/MF $0.75

Feasibility of manned participation in the control of the atmospheric flight of a large launch vehicle was investigated. Studies included simulation of rigid, elastic, and fuel-sloshing

dynamics of the Saturn V lunar mission vehicle. Fixed cockpit and centrifuge results indicate that pilots could satisfactorily stabilize the vehicle and reduce structural loads. They were also able to handle wide variations in vehicle parameters and to handle certain failure situations. Author

N65-23170*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
ATTENTION IN TIME DISCRIMINATION AND REACTION TIME

Alfred B. Kristofferson Washington, NASA, Apr. 1965 141 p refs
(Contract NAS2-1790)
(NASA-CR-194) CFSTI: HC $4.00/MF $1.00

A theory of attention is developed which emphasizes its temporal features. Attention is considered as a central-neural control of information flow accomplished within the central nervous system. That it is all-or-none in nature is hypothesized. The theory is framed and experiments are done in a sensory context. Of two methods for measuring the theoretical parameters, one involves the human ability to discriminate two independent sensory events as successive rather than simultaneous, and the other concerns the influence of channel uncertainty upon reaction time. Results of experiments to measure the theoretical parameters in these two ways are given: (1) The same signal may or may not be processed by attention, depending upon use made of its information. Channel uncertainty does not affect detection-reaction times, but does affect discrimination-reaction times. (2) Practice is an important variable. After extensive practice, attention is irrelevant to detection-reaction, but not to discrimination-reaction, time. (3) The four-signal, discrimination-reaction-time procedure cannot be used to estimate parameters for single individuals because of intra-individual variability. Author

N65-23171*# AiResearch Mfg. Co., Los Angeles, Calif.
STUDY OF THE THERMAL PROCESSES FOR MAN-IN-SPACE

W. L. Burriss Washington, NASA, Apr. 1965 245 p refs
(Contract NASw-1015)
(NASA-CR-216) CFSTI: HC $6.00/MF $1.50

Thermal control of the human body is analyzed for the environments obtained in spacecraft shirt-sleeve cabins and extravehicular pressure suits to provide environmental design criteria applicable to extraterrestrial missions. Basic heat and mass transfer correlations are used to establish dependence of the thermal processes and comfort criteria on atmospheric pressure and composition, gravity, ventilating velocity, gas temperature, humidity, and mean radiant temperature. The thermal and comfort criteria are analyzed for the lunar and zero-gravity shirt-sleeve cabins. Extravehicular suit thermal control methods employing ventilation cooling, liquid-loop cooling, and radiation cooling are analyzed to determine the relative performance, limitations, and problems associated with various methods of extravehicular suit thermal control. Extravehicular suit heat balances are performed for earth orbital, lunar orbital, Mars orbital, lunar plane, and lunar crater environments. Author

N65-23230 Brookhaven National Lab., Upton, N. Y.
THE GASES OF THE BLOOD

Donald D. Van Slyke 18 Nov. 1964 22 p refs *Its* Lecture Ser. no. 41 Sponsored by AEC
(BNL-898) CFSTI: $1.00

A brief review of the blood gases and their role in physiology and medicine is given as a historical sequence, and the contributions of some scientists whose studies were elementary in blood gas research and technology are described. Emphasis is placed on oxygen, carbon dioxide, and nitrogen content in the human blood. The importance of variations in oxygen pressure for the oxygenation of hemoglobin, the effects of CO_2 content in the atmosphere, the influence of acids on the oxygen content of hemoglobin, the oxygen saturation in blood, the use of oxygen chambers and tents in the treatment of patients, the use of hyperbaric oxygen to increase the X-ray efficiency in cancer treatments, are among the subjects presented. G.G.

N65-23283*# Maryland Univ., College Park. Dept. of Psychology
BEHAVIORAL RESEARCH AND EXPERIMENTAL ANALYSIS OF COMPLEX BEHAVIORAL REPERTOIRES UNDER FULL ENVIRONMENTAL CONTROL Semiannual Status Report, 1 Oct. 1961–31 Mar. 1962

Joseph V. Brady and Jack D. Findley [1962] 15 p refs
(Grant NsG-189-61)
(NASA-CR-62606) CFSTI: HC $1.00/MF $0.50

The general problem areas of investigation are outlined and several examples of specific experiments are given. The problem areas discussed are (1) basic research on the integration of complex behavioral repertoires as they relate to space flight problems; (2) development of better procedures for maintaining large and continuously effective behavioral outputs; (3) development of repertoire components relevant to space flight problems involving timing, counting, information processing, and decision making; (4) refinement of techniques for controlling and assessing changes in sensory and motor functioning, and (5) design of long term behavioral environments for overcoming problems of reliability, isolation, and confinement. E.E.B.

N65-23301# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.
INFLUENCE OF THE CARBOHYDRATES ON THE ABSORPTION OF $C^{14}O_3HNa$ THROUGH *CHLORELLA VULGARIS* IN LIGHT AND DARK [INFLUENCIA DE LOS HIDRATOS DE CARBONO EN LA ABSORCION DE $C^{14}O_3HNa$ POR LA *CHLORELLA VULGARIS* EN LA LUZ Y EN LA OSCURIDAD]

Leopoldo J. Anghileri 1965 12 p refs In SPANISH
(Rept.-135)

In a photosynthesis study, *Chlorella Vulgaris* was cultured to determine the influence of carbohydrates on the assimilation of $C_{14}O_3HNA$ under light and dark conditions. The pH level dropped in all cultures especially in the dark-exposed ones. This indicates a deviation in cellular metabolism due to the discontinued photosynthetic process. Carbohydrates were found to increase Chlorella's absorption of C_{14} in all cases but to a lesser degree in darkness. The concentration of the aspartic-glutamic acid group in the cellular protein was notably greater in the dark grown cultures. R.N.A.

N65-23306# Instituto Superiore di Sanita, Rome (Italy). Lab. di Fisica
A CHROMATOGRAPHIC STUDY OF DNA OF *B. STEAROTHERMOPHILUS* [STUDIO CROMATOGRAFICO DEL DNA DEL *B. STEAROTHERMOPHILUS*]

E. Dore 22 Dec. 1964 29 p refs In ITALIAN; ENGLISH summary
(ISS-64/48)

The chromatographic study performed on preparation of denatured DNA from *B. stearothermophilus* and on mixtures containing denatured DNA and RNA from the same microorganism, has led to the isolation of a homogeneous DNA fraction which is unable to reform double stranded structures under annealing conditions. This material corresponds to one of the two strands of native DNA and more precisely to that strand which does not interact with RNA in the formation, at room temperature, of a peculiar type of hybrid DNA–RNA molecule, as revealed by experiments performed at the analytical ultracentrifuge, in CsCl density gradients. The technical details of the chromatographic procedure are given, and the experiments which lead to the identification of the components separated chromatographically are described. Author

N65-23307# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

PREPARATION OF LABELING COMPOUNDS USING ^{131}I AT THE C.N.E.A. OF THE REPUBLIC OF ARGENTINA [PREPARACION DE COMPUESTOS MARCADOS CON ^{131}I EN LA C.N.E.A. DE LA REPUBLICA ARGENTINA]

A. E. A. Mitta and L. L. Camin 1964 13 p refs In SPANISH (Rept.-143)

A description is given of the various methods for preparing labelled compounds with the radioisotope iodine 131. A brief mention is made of their applications in the study of metabolic processes. Transl. by R N A

N65-23321# Joint Publications Research Service, Washington, D. C.

DEVELOPMENT OF LIFE IN THE UNIVERSE

A. G. Masevich 14 Apr. 1965 110 p refs Transl. into ENGLISH of the book "Vozniknoveniye Zhizni Vo Vselennoy" Moscow, 1964 110 p

(JPRS-29591; TT-65-30737) CFSTI: $4.00

CONTENTS:

IAA ENTRIES

A65-21025 #
CONCEIVABLE LIMITS OF MANNED SPACEFLIGHT [DIE VERMUTLICHEN GRENZEN DER BEMANNTEN RAUMFAHRT].
H. v. Diringshofen and E. H. Graul (Entwicklungsring Süd, Munich, West Germany).
Wissenschaftliche Gesellschaft für Luft- und Raumfahrt, and Deutsche Gesellschaft für Raketentechnik und Raumfahrtforschung, Jahrestagung, Berlin, West Germany, Sept. 14-18, 1964, Paper, 22 p. In German.

Discussion of the biological stresses of manned spaceflight as a factor limiting flight duration. Exposure of man to conditions of isolation in a spaceship for 1 to 3 years is seen to be conceivable from a medical point of view. Adequate diet, medical attention, facilities for leisure occupation, and an effective communications system are the basic requirements of prolonged flight. Accommodations in terms of space for moving about, hygiene, and convenience may be similar to those on an atomic submarine. Morale should be sustained by assurance that adequate conditions will be maintained throughout the flight and that the flight will end on schedule. V. Z.

A65-21156
THE SYSTEMATOLOGY OF FLIGHT INDICATION. I - SINGLE INDICATION [ZUR SYSTEMATIK DER FLUGANZEIGEN. I - DIE EINZELANZEIGE].
E. Rössger and R. Bernotat (Berlin, Technische Universität, Institut für Flugführung, Berlin, West Germany).
Luftfahrttechnik Raumfahrttechnik, vol. 11, Jan. 1965, p. 14-18. 5 refs. In German.

Discussion of the anthropotechnical problem of adaptation of machine to man, with special emphasis on information display in flight control. A conceptual structure of indication, which arises from the function and in which all the known indications can be ordered, is discussed. Some basic and some complex forms of single indication are considered in more detail. J.R.

A65-21208
THE IMPLICATIONS OF SPACE CREW PHYSICAL FITNESS MAINTENANCE TO SYSTEM DESIGN.
I. Streimer (San Fernando Valley State College, Northridge; North American Aviation, Inc., Canoga Park, Calif.) and B. Wendrow.
Journal of the Astronautical Sciences, vol. 12, Spring 1965, p. 27-29. 26 refs.

Consideration of cardiovascular alterations, impaired general fitness, and loss of skeletal calcium as adverse effects which could alter the probability of success of a space mission. The impact of exercise requirements upon systems design is discussed. A group of almost identical missions is assumed, differing only in the daily exercise requirements, which vary from a minimum of zero to a maximum of two hours per day. An oxygen consumption increase which parallels the increase in exercise requirements is also assumed. Illustrative examples are presented which were calculated from values which least penalized the system. F.R.L.

A65-21241
BAROSCOPIC TRAUMA OF THE EAR [OTOBAROPATIAS].
Pedro Gomez Cabezas.
Revista de Aeronáutica y Astronáutica, vol. 25, Feb. 1965, p. 117-124. In Spanish.

A study of the causes, effects, and treatment of baroscopic trauma of the ear. The anatomy of the middle ear is discussed in relation to the physiological changes produced by differences of atmospheric pressure, and the clinical symptoms which are manifested as a consequence are analyzed. The effect of predisposing factors, such as sinus infections, colds, and obstruction of the Eustachian tube, is considered, as well as the prophylactic measures to be adopted, such as swallowing, oral techniques, and the use of vaso-constrictors. The syndromes produced by baroscopic trauma of the ear are considered, both temporary and those of a more permanent nature, and the therapeutic and surgical measures recommended for their treatment are detailed. Aircraft dives exceeding 100 meters per minute of vertical descent are listed as spontaneously causing baroscopic syndrome or trauma of the ear. D. P. F.

A65-21273
MINIMUM DETECTABLE CHANGE IN INTERAURAL TIME OR INTENSITY DIFFERENCE FOR BRIEF IMPULSIVE STIMULI.
J. L. Hall, II (Massachusetts Institute of Technology, Dept. of Electrical Engineering and Center for Communication Sciences, Research Laboratory of Electronics, Cambridge, Mass.).
Acoustical Society of America, Journal, vol. 36, Dec. 1964, p. 2411-2413. 8 refs.
Research supported by the U.S. Department of Health, Education, and Welfare; National Institutes of Health, NASA; NSF; USAF; Navy; and Army.

Experimental psychophysical investigation performed on three subjects to determine the just-noticeable change in interaural time difference and interaural intensity difference as a function of overall intensity, for dichotic clicks. Results for the three subjects are shown. The percentage of correct judgments is plotted as a function of intensity of the stimulus, with $\Delta\tau$, the change in interaural time difference, as a parameter. Each point is based on results from two runs on two different days. Each point represents the average of at least 120 trials, with a median of approximately 200 trials per point. A figure shows the change in interaural time difference required for 75% correct judgments as determined by linear interpolation. The change in interaural time difference required for 75% correct judgments at low intensities was investigated in a separate experiment for one subject. The results are shown, and said to be in reasonable agreement with most of the existing data. Thresholds are high, because of the brief stimulus. M. M.

A65-21342
ASTRONAUTICAL PHYSIOLOGY - THE RESPIRATORY PROBLEM ON SPACEFLIGHTS [FISIOLOGIA ASTRONAUTICA - EL PROBLEMA RESPIRATORIO EN LOS VUELOS ESPACIALES].
Horacio Marco Moll.
Revista de Aeronáutica y Astronáutica, vol. 24, Dec. 1964, p. 1021-1026. In Spanish.

Discussion of the problem arising from the impossibility of carrying an adequate supply of stored oxygen on spaceflights, a problem which requires a solution based on photosynthesis. This would also help in solving the problem of CO_2 removal and the reuse of the water present in human wastes. The mechanism of photosynthesis and the role of the chlorplasts ATP and TPN in CO_2 absorption have been established by extensive experimental work. The relationship between light quanta of energy and the photochemical energy necessary to effect photosynthesis is shown, and quantitative data are given which indicate that efficiency rates of absorption vary between 30 and 50%. While photosynthesis is a possibility, several problems remain unsolved, such as the devices to be used in capturing and directing the types of radiation found in space which are most appropriate for the process of photosynthesis, the type and construction of the spaceships to be placed in orbit, and further investigation of the nature and types of radiation available in space from the Sun and other sources. D. P. F.

A65-21484
ANALYSIS OF BRAIN-WAVE GENERATORS AS MULTIPLE STATISTICAL TIME SERIES.
D. O. Walter (California, University, Medical Center, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.) and W. R. Adey (California, University, School of Medicine, Los Angeles, Calif.).
(American Psychological Association, Meeting, Philadelphia, Pa., Sept. 1963.)
IEEE Transactions on Bio-Medical Engineering, vol. BME-12, Jan. 1965, p. 8-13. 20 refs.
Grants No. NsG 203-62; No. AF AFOSR 68-81; U.S. Public Health Service Grant No. B-1883.

An illustrative example of the spectral analysis of simultaneously recorded electroencephalograms. The first topic is that of autospectral analysis, similar to frequency analysis. Cross-spectral analysis is used to show that the major relationship among three of the traces analyzed is linear; a fourth trace is nonlinearly activated. Two hypotheses suggested by this analysis are tested by methods of multivariate spectral analysis, a recently developed extension of the cross-spectral method. Another extension, generator analysis, the theory of which has not previously appeared, is presented both theoretically and in application to the same example. It incidentally provides a graphic summary of the multivariate relations among all the traces; but, more significantly, represents a substantial step toward the goal of identifying and localizing the actual biophysical generators which produced the observed electroencephalograms. (Author) M. L.

A65-21485
A SILICON DIODE CIRCUIT FOR DIRECT MEASUREMENT OF THE WBGT THERMAL STRESS INDEX.
N. Z. Lupu (Technion - Israel Institute of Technology, Dept. of Physics, Haifa, Israel).
IEEE Transactions on Bio-Medical Engineering, vol. BME-12, Jan. 1965, p. 40-43.

Presentation of the design of a simple electronic circuit for use in assessing a thermal environment by continuous monitoring and computation of the Wet-Bulb Globe Thermometer (WBGT) heat stress index. Silicon diodes are used as the temperature transducers. A simple resistive network for weighted summation of the voltages is developed. The instrument is battery-operated, and it is stated that it is suitable for laboratory and field use, and that monitoring and recording are possible from a remote site. A diagram of the computing circuit is presented as well as a sample 24-hour record of the index. (Author) M. L.

A65-21499
PHYSICAL EXAM IN ORBIT.
Herbert R. Seal (Spacelabs, Inc., Van Nuys, Calif.) and Gershon Weltman (California, University, Los Angeles, Calif.).
Electronics, vol. 38, Apr. 5, 1965, p. 99-105.

Review of the Gemini bioinstrumentation system. Two purposes of the systems are stated: to supply the medical monitoring team with information to safeguard the men in flight, and to add to existing knowledge. Photographs of the equipment and schematic diagrams of its arrangement are presented. The parameters considered are substantially the same as those of the earlier Mercury flights: heart and blood pressure, respiratory, and temperature. The instrumentation package, which each astronaut is fitted with, is built around five signal conditioners: (1) two electrocardiograph amplifiers, to detect the electrical signals produced by the heart; (2) an impedance pneumograph, which yields a waveform related to breathing rate and volume; (3) a temperature unit, which indicates oral temperature; and (4) a blood pressure unit, which supplies information for determining arterial blood pressure in the form of mixed signals representing arm cuff pressure and pulse sounds. Each component is discussed in detail, and a summary, in tabular form, is presented which gives the supplier, weight, volume, power consumption, and principal features for each component. The design, fabrication, and testing of the system are discussed. The system is considered to represent the best in miniature, flight-rated packaging with superior performance characteristics. M. L.

A65-21613
SYMBOLS FOR VIDEO MAPS.
R. N. Harrison (Solartron Electronic Group, Ltd., Farnborough, Hants., England).
World Aerospace Systems, vol. 1, Apr. 1965, p. 184-186.

Consideration of the type of information and of methods for its display in high resolution video maps. Symbols are shown which have been based in general on those in common use in aeronautical charts. At the same time, provision has been made for features not included on such charts, such as Decca airways and extended runway centerlines. In one case, additional information has been made available to the controller by indicating airfields in a manner which shows the lie and approximate length of the instrument runway. The choice of symbols has been based on experience gained with a series of map plates used in the solartron high resolution video map and on the comments of both civil and military controllers. To avoid clutter, information has been restricted to that which is essential to the controller. For instance, a controller needs to know the position of a facility exactly but, from his local knowledge, he is well aware whether it is a fan marker, MDB or VOR. The same open triangle has therefore been used for all beacons. M. M.

A65-21695
ELECTROCHEMICAL DEGRADATION OF HUMAN WASTES.
Robert G. Tischer, Lewis R. Brown, and Maurice V. Kennedy (Mississippi State University, Dept. of Microbiology, State College, Miss.).
IN: DEVELOPMENTS IN INDUSTRIAL MICROBIOLOGY. VOLUME 6.
Washington, American Institute of Biological Sciences, 1964, p. 237-244. 9 refs.
USAF-supported research.

Description of an electrochemical method of completely destroying a mixture of human feces and urine (1 to 14 ratio), using platinum electrodes. As opposed to previous bacterial waste-destroying methods, the present one leaves only inorganic salts and a small amount of unreacted material. Only platinum electrodes, with 1/2-inch spacing, were found satisfactory. The current level was 60 ma, average voltage 5, when used with 100 ml of a 1:10 dilution of wastes; power consumption required for total conversion of 10 ml of concentrated wastes was 0.30 watts, and after 96 hours of electrolysis the total solids were reduced to 36%. The gases evolved during electrolysis were collected and periodically analyzed. During lengthened electrolysis periods of up to 7 days, apparently additional organic materials are converted to inorganic compounds; the resulting solution is crystal-clear after filtration. D. P. F.

A65-21941 #
EFFECT OF γ-RAYS AND VIBRATION ON THE PHYSICOCHEMICAL PROPERTIES OF RED BLOOD CORPUSCLES [VLIIANIE GAMMA-LUCHEI I VIBRATSII NA FIZIKO-KHIMICHESKIE SVOISTVA KRASNYKH KROVIANYKH TELETS].
Iu. A. Kriger and E. A. Sverdlova (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR).
Akademiia Nauk SSSR, Doklady, vol. 160, Jan. 21, 1965, p. 713-716. 13 refs. In Russian.

Determination of the effect of γ-radiation and vibration on the dielectric and osmotic properties and the cation balance of erythrocytes. Tests were performed on whole blood and on a 25% suspension of erythrocytes. The source of radiation was Co^{60}. It is found that neither irradiation of erythrocytes in whole blood by a dose of 80 kr nor subsequent action of vibration on them causes any changes in the ohmic and capacitance components of the total resistance of the erythrocytes or in the frequency characteristic of the tangent of the loss angle. In the case of the 25% suspension of erythrocytes a certain discrepancy between the readings observed visually and calculated theoretically is noted. However, this discrepancy is regarded as not being a consequence of irradiation and vibration alone, but as being due to a change in the shape of the erythrocytes during prolonged storage in a salt medium not containing plasma. Thus it is seen that neither the dielectric nor the osmotic properties of erythrocytes change after irradiation and vibration. In order to test whether irradiation and vibration increase the sensitivity of erythrocytes to other deleterious agents, measurements were made of the potassium output from erythrocytes in an isotonic solution of saccharose. It was found that the potassium output from erythrocytes in such a solution increases considerably with an increase in the radiation dose. Vibration, on the other hand, does not intensify the potassium output. Finally, in tests of the osmotic resistance of erythrocytes, the latter property is found to increase during irradiation of whole blood, but to decrease during irradiation of an erythrocyte suspension. Vibration is seen to have no effect on the osmotic resistance of erythrocytes, regardless of the medium in which they are located. A. B. K.

A65-21945
DEGENERATION AND REGENERATION OF MYELINATED FIBERS IN THE CEREBRAL AND CEREBELLAR CORTEX FOLLOWING DAMAGE FROM IONIZING PARTICLE RADIATION.

Juan F. Estable-Puig, Rosita F. de Estable, Cornelius Tobias, and Webb Haymaker (U.S. Armed Forces Institute of Pathology, Washington, D.C.; California, University, Donner Laboratory, Berkeley; NASA, Ames Research Center, Moffett Field, Calif.). Acta Neuropathologica, vol. 4, 1964, p. 175-190. 18 refs.

Study concerned, on the one hand, with the effects of 48-Mev alpha-particle radiation, at a 6000-rad surface dose and a 30,000-rad peak dose, on nerve fibers of the cerebral and cerebellar cortex and, on the other hand, with subsequent nerve-fiber regeneration. Striking demyelination in the irradiated part of the cortex was already evident at the 96-hr period, but was most prominent in the region of maximal energy release - i.e., in the "Bragg-peak band." In time, the demyelination became still more profound. The myelin destruction was considered to be due chiefly to a direct effect of ionizing events on the myelin. Axis cylinders were much less radio-vulnerable than the myelin. At about the 16th day after irradiation, a regenerative process was underway. Evidence was obtained that pre-existing axis cylinders that had lost their myelin became remyelinated. Myelinated nerve sprouts issuing chiefly from afferent fibers beneath the band began populating the band at this time period and grew progressively within it. The end-stage of fiber regrowth was considered to be between the 4th and 7th month after irradiation. The new growth was considered an expression of an innate capacity possessed by the central nervous system for continual axonal regrowth. Only reactive microglia-like cells were present in abundance in the region of axonal regrowth. Whether oligodendroglia had any influence on the remyelination cannot be stated. Similar changes were found to occur in cerebellar cortex under the same experimental conditions.

(Author) D.H.

A65-21947

A LONG-TERM ELECTRODE SYSTEM FOR ELECTROCARDIOGRAPHY AND IMPEDANCE PNEUMOGRAPHY.

J. L. Day and M. W. Lippitt, Jr. (NASA, Manned Spacecraft Center, Crew Systems Divs., Houston, Tex.).

Psychophysiology, vol. 1, Oct. 1964, p. 174-182. 6 refs.

Description of an electrode system which is a modification of that used on the Mercury space flights for electrocardiography and impedance pneumography. The manufacturing procedure for the electrodes (of silver and silver chloride composition), the preparation of a nonirritating electrode paste, and the application of the electrodes are described in detail. Tests were made on 21 subjects for periods up to 96 hr. Only nine electrodes failed during the entire test in which subjects engaged in active sports and bathed. Irritation of the skin was minimal. (Author) D.H.

A65-21948

CONDITIONS AFFECTING THE EARLY THYMINELESS DEATH OCCURRING AFTER ULTRAVIOLET IRRADIATION OF ESCHERICHIA COLI B3.

Robert B. Painter and Ronald E. Rasmussen (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).

Photochemistry and Photobiology, vol. 4, 1965, p. 61-65. 13 refs.

Observation of factors inconsistent with the concept of Gallant and Suskind that a lack of thymine renders inoperative the repair mechanism of Escherichia coli B3. Exposure of the thymine-requiring bacterium E. coli B3 to UV prior to incubation in the absence of thymine shortens the lag period normally observed before the onset of death due to the lack of thymine. Culture conditions promoting synthesis of new kinds of enzymes at the time of thymineless challenge after UV irradiation enhance this effect. The effect can be reversed either by the addition of thymine or photoreactivation. Possible mechanisms for these phenomena are discussed. (Author) D.H.

A65-21951

THE DARK SIDE OF THE LASER.

J. J. Schlickman and R.H. Kingston (Massachusetts Institute of Technology, Lincoln Laboratory, Lexington, Mass.).

Electronics, vol. 38, Apr. 19, 1965, p. 93-98. 7 refs.

Description of a dosimeter that measures the energy of a reflected laser pulse, developed as a safeguard against eye damage. Readings of the dosimeter will tell when the radiation has reached the danger level. Data obtained from experiments on eye damage in rabbits were used to develop and calibrate the laser dosimeter. The device is named pulsed laser dosimeter because it measures the total energy exposure per laser pulse and utilizes a modified gamma-radiation dosimeter as a high-impedance voltmeter. In addition, the observer is provided with an absolute means of determining the radiation dosage, since the calibrated scale is a linear function of energy density. The instrument's dynamic range encompasses all the known normal mode lasers operating within the S-1 spectral response (6,000 to 10,000 Å) of the detector. Provisions have not been made, however, for work with Q-spoiled lasers, which produce pulses having a rise time of 0.5 to 1 nanosecond, and a duration of only a few nanoseconds. This is said to be due to design difficulties and to a lack of quantitative data about such lasers. M.M.

A65-22032

MANUAL CONTROL OF AN UNSTABLE SYSTEM WITH VISUAL AND MOTION CUES.

Laurence R. Young and Jacob L. Meiry (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Cambridge, Mass.).

(Institute of Electrical and Electronics Engineers, International Convention, New York, N.Y., Mar. 22-26, 1965.)

IEEE International Convention Record, vol. 13, pt. 6, 1965, p. 123-127.

Grant No. NsG 577.

Investigation of the control characteristics of the human operator in control situations where he is limited to the use of visual, vestibular-tactile, or combined visual-vestibular sensing of motion. A moving-base flight simulator programed as an unstable system of varying divergence frequencies is the controlled element of the loop. The performance of the operator is compared in a series of increasingly difficult control tasks which require more lead compensation to achieve stable closed-loop operation. It is shown that the range of control is extended to higher divergence frequencies with the presence of motion cues, which enable the operator to develop a greater amount of phase lead than under visual tracking. The general function of the vestibular apparatus in dynamic orientation and its importance in vehicle control are discussed.

(Author) A.B.K.

A65-22033

A THEORY FOR OPTIMAL DETERMINISTIC CHARACTERIZATION OF TIME-VARYING HUMAN OPERATOR DYNAMICS.

Walter W. Wierwille (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.).

(Institute of Electrical and Electronics Engineers, International Convention, New York, N.Y., Mar. 22-26, 1965.)

IEEE International Convention Record, vol. 13, pt. 6, 1965, p. 128-142. 15 refs.

Contract No. NAS 1-3485.

Description of a deterministic theory of characterization which can be used to determine the time-varying dynamics of a human operator engaged in a tracking task. With this theory it is possible to obtain a time-varying impulse-response function and a time-varying transfer function which represent the action of a human operator in an open- or closed-loop control system. No special form of input is required. The characterization, which may be in either real-time or nonreal-time, is based upon an exact theory of fixed-form optimization. A strongly convergent, definitely stable, iteration technique can be used to realize the optimal characterization filter. The theory takes the time variation of the impulse-response or transfer function into account, so that it is unnecessary to make the assumption of slowly varying dynamics.

(Author) A.B.K.

A65-22037

ABSENCE OF AN ODD-ERROR SIGNAL MECHANISM IN HUMAN ACCOMMODATION.

Lawrence Stark and Yoshizo Takahashi (Massachusetts Institute of Technology, Electronic Systems Laboratory and Biology Dept., Cambridge, Mass.).

(Institute of Electrical and Electronics Engineers, International Convention, New York, N.Y., Mar. 22-26, 1965.)

IEEE International Convention Record, vol. 13, pt. 6, 1965, p. 202-213. 25 refs.

United States Public Health Service Grants No. NB 3055-3; No. NB 3090-3; Grant No. AF AFOSR 155-63; Contract No. DA-18-108-405-CML-942.

Description of experiments designed to demonstrate that retinal blur operates as an even-error signal under restricted monocular viewing conditions. The fact that 50% of the initial movements are in error is said to be a null experimental result, which should be unaffected by various contaminants that may have affected previously published results. It is shown that the 2-cps spontaneous oscillation of the lens does not operate as part of a phase-sensitive demodulation system converting the even-error blur signal to an odd-error signal. These oscillations are said to be explainable as the consequence of important nonlinear characteristics of the accommodative servomechanism. Input-adaptive predictive capability of the accommodative system is said to be related to similar capabilities in versional visual tracking and in hand-tracking studies. A.B.K

A65-22105 #
THE ROLE OF SIMULATION IN APOLLO SPACECREW TRAINING.
Richard T. Cave (North American Aviation, Inc., Space and Information Systems Div., Downey, Calif.).
American Institute of Aeronautics and Astronautics, Air Force Logistics Command, and Aeronautical Systems Division, Support for Manned Flight Conference, Dayton, Ohio, Apr. 21-23, 1965, Paper 65-274. 7 p.
Members, $0.50; nonmembers, $1.00.

Discussion of the advantages accruing to the Apollo program because of its position in time from experience both in actual and simulated space flight gained through projects Mercury and Gemini. Apollo crewmen have been selected upon extremely rigorous physical, mental, and experience criteria. Thus, the astronauts selected for the Apollo program will bring with them the combination of preastronaut experience and/or vicarious space experience on the two preceding space programs. The implications of this highly select, small group of potential Apollo crewmen as they relate to Apollo training are discussed, not only in terms of training, but also in terms of their participation in engineering simulation. The future Apollo space crews currently participate actively in the spacecraft development for the Apollo missions. The knowledge gained through these activities adds to the total preparation for the Apollo mission and must be related to the actual training program. Of particular importance here is the astronaut activity in design reviews and within the Apollo simulation program. The more formal Apollo crew training plans are discussed in detail. (Author) M.M.

A65-22125 #
CREW RELIABILITY DURING SIMULATED SPACE FLIGHT.
Milton A. Grodsky, Thomas M. Flaherty (Martin Marietta Corp., Martin Co., Man-Machine Engineering Dept., Baltimore, Md.), and Heber G. Moore (NASA, Office of Manned Space Flight, Washington, D.C.).
American Institute of Aeronautics and Astronautics, Air Force Logistics Command, and Aeronautical Systems Division, Support for Manned Flight Conference, Dayton, Ohio, Apr. 21-23, 1965, Paper 65-275. 20 p. 11 refs.
Members, $0.50; nonmembers, $1.00.
Contract No. NASw-833.

Description of a simulation experiment designed to obtain improved estimates of pilot reliability for manned space-flight missions. An integrated mission simulation technique was used for the seven-day lunar mission. Trained test pilot personnel, realistic displays, vehicle dynamics, operational procedures, etc., were incorporated into the simulation. The results indicated no statistically significant degradation in performance from premission levels during the seven-day lunar mission, with the exception of certain midcourse correction switching phases. However, it was suggested that the large premission variance might have covered some significant effects. Continued simulation with an increased number of subjects is required to determine the efficacy of this hypothesis. A comparison was made between the present simulation data and other data available in the literature. The results of this comparison indicated fairly large differences in estimated reliability. These differences suggested a review of current modes of estimating reliability and the possible importance of an integrated mission simulation technique in the determination of pilot reliability in those situations in which inflight evaluation is not possible.
(Author) M.M.

A65-22137
DETECTION OF LIFE-RELATED COMPOUNDS ON PLANETARY SURFACES BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY TECHNIQUES.
K. E. Bentley, C. E. Giffin, D. G. Whitten, and W. F. Wilhite (California Institute of Technology, Jet Propulsion Laboratory, Space Sciences Div., Pasadena, Calif.).
IN: TOWARDS DEEPER SPACE PENETRATION; PROCEEDINGS OF AN AAS SYMPOSIUM HELD AS PART OF 131ST MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, MONTREAL, CANADA, DECEMBER 29, 1964, (AAS Science and Technology Series. Volume 2). [A65-22134 12-30] Edited by E. R. Van Driest.
North Hollywood, Western Periodicals Co., 1964, p. 93-117.
6 refs.

A65-22167 #
MAN-IN-THE-LOOP SPACE STATION NAVIGATIONAL AND CONTROL SIMULATION.
B. T. Bachofer (General Electric Co., Missile and Space Div., Philadelphia, Pa.).
American Institute of Aeronautics and Astronautics, Air Force Logistics Command, and Aeronautical Systems Division, Support for Manned Flight Conference, Dayton, Ohio, Apr. 21-23, 1965, Paper 65-277. 8 p.
Members, $0.50; nonmembers, $1.00.

Discussion of the navigation and control simulation associated with the overall manned space cabin test program. Using the whole mission simulation approach with a highly skilled professional crew, the performance data obtained on individual part tasks (such as in manual navigation and control) are considered to be closely representative of the orbital situation. A brief description of the total test program is presented to provide the background within which the navigation and control tasks were performed. It is concluded that the simulated control system was assembled from readily available hardware in a relatively short time. No attempt was made to optimize the system for either manual or automatic operation.

A65-22169 #
PHYSICAL DECONDITIONING DURING PROLONGED SPACE FLIGHT.
Perry B. Miller (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
American Institute of Aeronautics and Astronautics, Air Force Logistics Command, and Aeronautical Systems Division, Support for Manned Flight Conference, Dayton, Ohio, Apr. 21-23, 1965, Paper 65-281. 7 p. 20 refs.
Members, $0.50; nonmembers, $1.00.

Discussion of anticipated medical problems of prolonged space flight, including postural intolerance to gravity after landing, diminished physical work capacity, decreased blood volume, excessive excretion of calcium in the urine, and muscular weakness. An excessive urinary loss of calcium may predispose the astronaut to kidney stones and, eventually, to weakened bones. No significant change is expected in tolerance to the transverse acceleration of reentry. Prolonged bed rest, analogous in several respects to prolonged space flight, has been used to evaluate the efficacy of various countermeasures adaptable to space flight. No procedure to date (including intermittent inflation of blood pressure cuffs on the extremities, positive pressure breathing, various types of in-bed exercise programs, and lower body negative pressure) has been completely effective in preventing the loss of postural tolerance during bed rest. Preliminary studies suggest that lower body negative pressure may become an effective procedure. In subjects with postural intolerance after bed rest, the wearing of an anti-G suit prevents postural fainting. Physical work capacity can be maintained by vigorous exercise on a bicycle ergometer. No measure to prevent excessive urinary calcium excretion has been found. Muscular strength can be preserved by isometric exercise. It is noted that the observation of postural intolerance after space flights has intensified interest in possible medical problems of prolonged space flight. Postural intolerance had been predicted earlier on the basis of a presumed similarity in several respects of prolonged space flight to prolonged bed rest. In both environments, the need for physical activity is greatly diminished, significant positional changes in hydrostatic pressure in the body fluids are absent, and weight

bearing in the erect position is not present. As the body adjusts to the diminished stresses of bed rest, a number of physiological events occur, including changes in the heart and blood vessels, changes in the volume of the blood, changes in muscular strength, and changes in the calcium content of the bones and urine. (Author) M. M.

A65-22175 #
THE COMMON KNOWLEDGE CONCEPT AS APPLIED TO FLIGHT CREW TRAINING.
Clifford L. Stout (Douglas Aircraft Co., Inc., Aircraft Div., Engineering Test Pilot, Long Beach, Calif.).
Society of Experimental Test Pilots, Technical Review, vol. 7, no. 3, 1965, p. 29-33.

Discussion of the common knowledge concept, defined as one which permits all cockpit crew members the same level of knowledge in respect to the systems of the aircraft, and the normal/abnormal operation of the systems. It is considered that such knowledge is more important than the possession of a complex knowledge of the details of the structure of the aircraft, especially if it is impossible for the crew to have access to an affected area in flight. The common knowledge concept should allow a crew to coordinate their activities to a much greater degree of proficiency than could be expected from a crew which is split by one or more members being more knowledgeable than others. It is pointed out that when crew coordination is curtailed, the operation is exposed to incident, and snowballing can rapidly occur. It is concluded that there are still benefits to be derived from improved flight crew training.
F. R. L.

A65-22222
LACK OF ARTIFICIAL ACCLIMATIZATION TO HEAT IN PHYSICALLY FIT SUBJECTS.
J. E. Greenleaf (NASA, Ames Research Center, Moffett Field, Calif.).
Nature, vol. 203, Sept. 5, 1964, p. 1072. 5 refs.

Brief review of studies on the artificial acclimatization to heat of physically fit subjects performing exercises. The acclimatization procedure consisted of five two-hr walks on an every-other-day sequence. The usual changes in sweat rates, rectal temperatures, and pulse rates were not observed. It is suggested that the physiological changes induced in the subjects as a result of their high physical fitness precluded any heat effects. Thus, the subjects were able to perform as though they were acclimatized to heat. Problems in distinguishing between changes due to environmental stimuli and those due to the exercise are discussed. P.K.

A65-22260 #
SOVIET TRAINING CONCEPTS AND THE UTILIZATION OF SIMULATORS.
Forrest R. Ratliff (USAF, Systems Command, Aerospace Medical Div., Brooks AFB, Tex.).
American Institute of Aeronautics and Astronautics, Air Force Logistics Command, and Aeronautical Systems Division, Support for Manned Flight Conference, Dayton, Ohio, Apr. 21-23, 1965, Paper 65-276. 9 p. 11 refs.
Members, $0.50; nonmembers, $1.00.

Assessment of current Soviet training theories and of their use of simulation devices and techniques in training practices. It is noted that, prior to the revolution, Russia had an adequate education system as judged by Western European standards. After the revolution, Soviet education entered a less systematic, experimental period which resulted in a downgrading of the general educational system. A return to traditional methodology was tempered by the requirements of Marxist-Leninist teaching and an emphasis on Pavlovian theories of behavior. There is no evidence of the systematic use of trainers or simulators until the early fifties, when the innovation of high-performance aircraft and the requirements of the manned space-flight program caused a search for new training methods and concepts. The Soviet military, suffering most acutely from the need for improved training methods in many areas of skill, initiated consideration of programed instruction and developed plans for large-scale implementation. An assessment indicates that the Soviets possess the professional skills and planning resources to define simulation requirements across a broad spectrum of tasks involved in the operation of complex dynamic systems. The use by the Soviets of comprehensive simulation techniques for validation of the role of man in space prior to their first manned space flight indicates an understanding of the implications of simulation beyond skill acquisition. (Author) M.M.

A65-22329
MEASUREMENT OF CARDIAC EVENTS BY A PRECISE TECHNIQUE COMPARISON WITH VIBROCARDIOGRAM.
Clarence M. Agress (Cedars of Lebanon Hospital, Institute for Medical Research; California, University, Dept. of Medicine, Los Angeles, Calif.), Stanley Wegner, and Shigeo Nakakura (Cedars of Lebanon Hospital, Institute for Medical Research, Los Angeles, Calif.).
Japanese Heart Journal, vol. 5, Sept. 1964, p. 414-430. 21 refs.
Research supported by the Morris and Mary Press Foundation; Grant No. NsG 289-62.

Comparison of precordial vibrations recorded from the left parasternal area in dogs with left and right heart pressure curves (left and right auricular, ventricular, and aortic and pulmonary artery) in order to assess the accuracy of the vibrocardiogram in the determination of the duration of hemodynamic events. In addition, comparisons were made with time derivatives of these pressure phenomena, force recordings obtained from both ventricles, and aortic flow curves. Recordings of these parameters were obtained using an oscilloscope and camera attachment to permit high recording speeds and measurement accuracy. The findings of this study indicate a high degree of correlation between the vibrocardiogram and left heart pressure events and their derivatives as well as with left ventricular force recordings. Such relationships were not found with right heart pressure events. It was concluded that precordial vibrations in the left parasternal area in dogs are predominantly left ventricular in origin and that accurate determinations of the durations of left heart pressure events may be obtained from the vibrocardiogram. (Author) D.H.

A65-22331
A PROGRESS REPORT ON RADIO TELEMETRY FROM INSIDE THE BODY.
R. Stuart Mackay (California, University, Space Sciences Laboratory and Medical Physics Div., Berkeley, Calif.).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION; PROCEEDINGS OF THE SECOND NATIONAL BIOMEDICAL SCIENCES INSTRUMENTATION SYMPOSIUM, UNIVERSITY OF NEW MEXICO, ALBUQUERQUE, N. MEX., MAY 4-6, 1964. VOLUME 2.
Edited by W. E. Murry and P. F. Salisbury.
New York, Plenum Press, 1964, p. 275-292. 5 refs.
Grant No. NsG 600.

Description of telemetry units suitable for transmitting measurements of body temperature, pulse rate, blood pressure, body acceleration, and many other variables from within the bodies of men and animals to remote locations. Various units have been demonstrated that are small enough to fit in the eye, powerful enough to transmit from a freely swimming dolphin in ocean water, stable enough to transmit multiple information continuously for years after implanting, and suitable for tracking wild animals. Laboratory and field experiments are described, using both passive and active transmitters. (Author) D.H.

A65-22352
RESPONSES OF SINGLE DORSAL CORD CELLS TO PERIPHERAL CUTANEOUS UNMYELINATED FIBRES.
Lorne M. Mendell and Patrick D. Wall (Massachusetts Institute of Technology, Dept. of Biology, Cambridge, Mass.).
Nature, vol. 206, Apr. 3, 1965, p. 97-99.
Research supported by the Bell Telephone Laboratories and Teagle Foundation; National Institutes of Health Grants No. MH-04737-04, No. NB-04897-02; NSF Grant No. GP-2495; Grants No. NsG-496; No. AF AFOSR 591-64; Contracts No. AF 33(615)-1747; No. DA-36-039-AMC-03200(E).

Investigation of the response of cells in the dorsolateral tract (DLC) of the cat. The lumbar enlargement and sural nerve are exposed in acute cats, and the sural nerve is stimulated by an externally triggered electronic switch. Stimulation, approximately

30 v for 0.5 msec, is done through 50-kΩ resistors to provide a constant balance in spite of resistance variations across the axons during stimulation. The difference in the response elicited by stimulation of A and C fibers is compared. The fundamentally different effects of stimulation of A and C fibers is emphasized. A fibers, after a short intense burst, are found to turn the cell off, which it is suggested, is probably the result of the negative feedback exerted by the A's on themselves as seen by the negative dorsal root potential. The C fibers are found to turn the postsynaptic cell on after the repetitive discharge, which it is suggested may be the effect of the positive feedback of the C's on the A's as seen from the dorsal root potential. It is concluded that the results show that both A and C fibers converge on many of the dorsal horn cutaneous cells. The C fibers are found to produce a disproportionately large delayed discharge. M.L.

A65-22465

RELATION OF SLANT AND SHAPE JUDGMENTS IN REDUCED VIEWING.

A. H. Smith (Defence Research Medical Laboratories, Toronto, Canada).

Canadian Journal of Psychology, vol. 18, no. 3, 1964, p. 224-234. 9 refs.

Results of observers' estimations of the slant and drawing of the apparent shape of a homogeneous white circle and a similar rectangle under monocular and binocular reduction conditions for 0^{o} and 4^{o} of geometric slant. The results failed to support the invariance hypothesis in terms of the requirement that, when slant is underestimated relative to geometric slant, but is significantly greater than zero, shape estimates should approach, but not coincide with, the projective shape. The findings are discussed in relation to the view that the hypothesis should be tested without reference to the projective geometry of the stimuli. (Author) M.M.

A65-22466

DELAY OF RESPONSE IN THE PERCEPTION OF SLANT AND SHAPE.

A. H. Smith (Defence Research Medical Laboratories, Toronto, Canada).

Canadian Journal of Psychology, vol. 18, no. 3, 1964, p. 235-244. 8 refs.

Experimental investigation of the judgment of observers of the slant and shape of a circle, a rectangle, and a triangle, homogeneous white forms, monocularly under reduced viewing at 0^{o}, 20^{o}, 40^{o}, and 60^{o} geometric slant. Response conditions for the four groups of 24 observers were, respectively, no delay, and 2, 4, and 8 seconds' delay. Delay produced a significant overall decrement in apparent slant which, for both no delay and delay, was significantly less than geometric slant and significantly greater than 0^{o}. Delay had no significant overall effect on apparent shape, which, for both no delay and delay, was similar to projective shape. The most prominent specific effect of delay on apparent shape was for the rectangle, which became significantly more like projective shape. The relation between apparent slant and shape failed to accord with the invariance hypothesis. The effect of delay was at variance with the view that drawn shape is confounded by implicitly judged slant (Author) M.M.

A65-22467

PERFORMANCE DECREMENT IN VIGILANCE, THRESHOLD, AND HIGH-SPEED PERCEPTUAL MOTOR TASKS.

Jane F. Mackworth (Defence Research Medical Laboratories, Toronto, Canada).

Canadian Journal of Psychology, vol. 18, no. 3, 1964, p. 209-223. 53 refs.

Consideration of the decrement in performance found in vigilance threshold determinations, and high-speed perceptual motor tasks, which appears to be a linear function of the square root of time on task; it is suggested that the common factor is a requirement for continuous attention. The decrement can be prevented in both active and passive tasks by rest pauses, knowledge of results, and amphetamine. (Author) M.M.

A65-22614

EYE PROTECTION AGAINST LASERS.

C. H. Swope and C. J. Koester (American Optical Co., Southbridge, Mass.).

(Optical Society of America, Spring Meeting, Washington, D.C., Apr. 1964.)
Applied Optics, vol. 4, May 1965, p. 523-526. 6 refs.

Calculations from published data on threshold dosage for an observable retinal lesion to determine the attenuation required to protect the human eye against pulsed laser radiation. Several highly attenuating filters were evaluated in terms of the maximum laser energy against which they provide protection. Because of their very high absorption, some of the filters were found to break or craze at relatively low energies. A solution to this problem which provides eye protection against an Nd-doped glass laser delivering up to 740 J in an impact area 5 mm in diameter on the filter is described. Several suggestions are made for protecting the eyes of personnel working with lasers. (Author) F.R.L.

A65-22674

ARTHROPOD PREPARATION FOR BEHAVIORAL, ELECTROPHYSIOLOGICAL, AND BIOCHEMICAL STUDIES.

W. C. Corning, D. A. Feinstein, and J. R. Haight (Michigan State University, Dept. of Biophysics, East Lansing, Mich.).

Science, vol. 148, Apr. 16, 1965, p. 394, 395.
Grant No. NsG 475.

Demonstration that electrodes and cannulae can be permanently implanted in the horseshoe crab, Limulus polyphemus. Recordings of electrical activity can be obtained from the optic nerve, heart, and abdominal ganglia, and the cannulae are said to be effective routes for introducing isotopes into the nervous system. The animals survive for at least thirteen days and are said to be behaviorally unimpaired. (Author) A.B.K.

A65-22675

SELECTIVE ATTENTIVENESS AND CORTICAL EVOKED RESPONSES TO VISUAL AND AUDITORY STIMULI.

Paul Spong, Manfred Haider, and Donald B. Lindsley (California, University, Departments of Psychology and Physiology, Los Angeles, Calif.).

Science, vol. 148, Apr. 16, 1965, p. 395-397. 9 refs.
Contracts No. NsG 623; No. Nonr-233(32); NSF Grant No. GB-1844.

Study of short-term attentiveness to either click or flash stimuli presented alternately. Cortical-evoked responses to flashes and clicks were recorded from human subjects performing visual or auditory tasks under three conditions of selective attentiveness. The subjects were required to attend to the flashes and to ignore alternating clicks, or vice versa. Responses to flashes recorded from the occipital area were found to be larger when attention was directed toward visual stimuli, and responses to click stimuli recorded from the temporal area were larger when attention was directed toward auditory stimuli. (Author) A.B.K.

A65-22688

BIOMEDICAL ASPECTS OF THE X-15 PROGRAM.

Harry R. Bratt (USAF, System Command, Flight Test Center, Edwards AFB, Calif.).

(Association of Military Surgeons of the United States, Annual Meeting, 71st, Washington, D.C., Oct. 20-22, 1964.)
Military Medicine, vol. 130, Apr. 1965, p. 404-414. 6 refs.

Description of biomedical experience obtained with the X-15 aircraft, which has attained altitudes up to 350,000 ft and velocities to 4105 mph. The development and modifications in the bioinstrumentation system for the X-15 are discussed. The present system provides for the measurement of ECG, helmet/suit and suit/cabin pressure differentials, blood pressure, and the partial pressure of oxygen in the breathing space. The output of the system is a multiplexed FM signal. The development of the full pressure suit used in the X-15 is discussed. Physiological data obtained from X-15 flights are described, including data on heart rate, respiratory rate, and blood pressure. P.K.

A65-22704
INTEGRATING CREW PERFORMANCE INTO SPACE VEHICLE SYSTEM DESIGN FOR OPTIMUM RELIABILITY.
Wilton P. Chase (Aerospace Corp., Reliability Dept., Systems Analysis Section, El Segundo, Calif.).
IN: MANNED SPACE RELIABILITY, SYMPOSIUM, ANAHEIM, CALIF., JUNE 9, 1964, PROCEEDINGS (AAS Science and Technology Series. Volume 1).
Symposium sponsored by the American Astronautical Society, Los Angeles Section.
Edited by P. Horowitz.
North Hollywood, Western Periodicals Co., 1964, p. 29-47.

Discussion of the use of systems engineering to develop an optimum-reliability design for a manned space satellite. The procedure used incorporates crew performance as an essential element of the total system design. The contribution of crew performance to system effectiveness (for overall mission reliability) is illustrated by an analysis of the in-space maintenance requirements. The identification, definition, design, development, and testing of the crew performance of in-space maintenance tasks are discussed, and their incorporation into a manned-satellite research and development program is described. P.K.

A65-22752
AN INTRODUCTION TO BIOLOGICAL INTERACTION WITH SPACECRAFT MATERIALS.
H. W. Rose, O. M. Meredith, V. H. Lynch, and A. H. Hammond (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).
IN: SPACE MATERIALS HANDBOOK.
Edited by C. G. Goetzel, J. B. Rittenhouse, and J. B. Singletary.
Reading, Mass., Addison-Wesley Publishing Co., Inc., 1965, p. 559-582. 66 refs.

Discussion of the interaction of biological matter with the materials used in the construction of spacecraft. The toxic effects of spacecraft materials on man are reviewed, and include those associated with paints, refrigerants, plastics, lubricants, and contaminants found in the spacecraft atmosphere. The effects on spacecraft materials of biological byproducts are discussed, including the effects of feces, urine, flatus, sebum, sweat, exhaled air, vomit, algae, fungi, and bacteria. P.K.

A65-22759
THE DANGERS INHERENT IN OXYGEN DEFICIENCY FOR PARACHUTE SPORT JUMPERS [DIE GEFAHREN DES SAUERSTOFFMANGELS BEIM FALLSCHIRMSPORTSPRINGEN].
Heinz Girnth.
Deutscher Aerokurier, vol. 9, Apr. 1965, p. 199, 200. In German.

Description of the symptoms characteristic of oxygen deficiency and its effects on the human organism, with particular application to aircraft personnel and parachute jumpers. The symptomatology is divided into zones of altitude above sea level. Up to about 3000 m no changes due to oxygen deficiency are observed other than a decrease in visual acuity, of which the individual often is not conscious. From about 3000 to 4500 m, the organism attempts to adapt to the environment by compensation (the rate of respiration and heartbeat increase), but this mechanism may take an hour to become apparent. From 4200 to 4500 m, symptoms of oxygen deficiency may appear in 20 minutes, with fatigue, irritability, headaches, and at times something like alcoholic euphoria. Between 4500 and 6000 m compensation mechanisms break down. The symptoms are characterized by headaches, giddiness, breathing difficulties, and loss of sight; death, even after prolonged exposure, is unusual. Above 6000 m, physical and mental incapacitation sets in. Loss of memory, muscular cramps, cyanosis, and loss of consciousness are usual. Death ensues in a period of time which depends on the altitude. D.P.F.

A65-22770
AN ALGAL MEDIUM PRODUCED FROM HUMAN WASTES.
Lewis R. Brown, Maurice V. Kennedy, and Robert G. Tischer (Mississippi State University, Dept. of Microbiology, State College, Miss.).
Developments in Industrial Microbiology, vol. 6, 1964, p. 245-249.
USAF-supported research.

Discussion of the use of electrolyzed daily output (feces and urine which have been treated electrochemically) to serve as a growth medium for Chlorella 7110S. Evaluation of the EDO was carried out in 22 x 175 mm test tubes, aerated with CO_2-enriched air (5%) at a light intensity of 600 foot candles. Growth responses were assessed in terms of increase in cells (dry weight). EDO which had been diluted 1:10 prior to 96 hours of electrolysis yielded 1.370 g/liter increase in dry weight of cells in 48 hr, while EDO diluted 1:5 and otherwise treated the same produced 1.753 g/liter increase. EDO subjected to the same treatment with the exception that dilution which occurred subsequent to electrolysis yielded respectively 1.944 and 3.058 g/liter increase. Knop's medium used as the control produced 2.074 g/liter increase. (Author) F.R.L.

A65-22771
SOME CRITERIA OF LIVING SYSTEMS USEFUL IN THE SEARCH FOR EXTRATERRESTRIAL LIFE.
Freeman H. Quimby (NASA, Office of Space Science and Applications, Washington, D.C.).
Developments in Industrial Microbiology, vol. 5, 1964, p. 224-234. 18 refs.

Discussion of a variety of approaches to the direct or indirect identification of extraterrestrial life, concentrating on microorganisms. Some attempts at defining life are critically examined, and the roles of various elements, especially carbon, are discussed. Micromolecules, macromolecules, and energy transformations receive attention. Proteins and amino acids, growth, and autotrophic bacteria, both chemosynthetic and photosynthetic, are considered. It is considered that life is inseparable from water. The morphology of living systems is discussed, and comment is made that sound is a more common means of communication than is generally thought. F.R.L.

A65-22901
AGE DIFFERENCES IN SEQUENTIAL DECISIONS AND CARDIOVASCULAR STATUS AMONG PILOTS.
Jacek Szafran (Lovelace Foundation for Medical Education and Research, Dept. of Experimental Psychology; New Mexico, University, Albuquerque, N. Mex.).
(Aerospace Medical Association, Annual Meeting, Miami, Fla., May 13, 1964.)
Aerospace Medicine, vol. 36, Apr. 1965, p. 303-310. 28 refs.
U.S. Public Health Service Research Grant No. HD-0518.

Data on the responses of a group of variously aged pilots when required to identify a sequence of signals by operating an appropriate control with the maximum of speed and the minimum of error. The intersignal intervals vary randomly over some suitable range (e.g., 0.5 to 5.0 sec, in steps of 0.5 sec), in runs of several hundreds in length, each signal having an equal probability of occurrence in ensembles of different numbers of alternatives (e.g., 3, 5, 8, etc.) so that at any moment the subject is uncertain which signal is likely to occur and when. A detailed report of response latencies, in msec, together with error rates is obtained and the data quantitatively analyzed with a computer. It is shown that age differences in the rate of gain of information are less impressive than might be expected from other gerontological data; pilots over 40 years of age are relatively more susceptible than the younger to the effects of information overload, particularly if this involves short-term recall when some other activity intervenes during the period of retention. D.P.F.

A65-22902
METABOLISM AND X-RAY SENSITIVITY OF CHICK EMBRYOS INCUBATED IN A HELIUM-OXYGEN ATMOSPHERE.
R. A. Wright, M. A. Lessler, H. S. Weiss, and E. P. Hiatt (Ohio State University, Dept. of Physiology, Environmental Physiology Laboratory, Columbus, Ohio).
Aerospace Medicine, vol. 36, Apr. 1965, p. 311-314. 15 refs.
Grant No. NsG 295-62.

Incubation of fertile chicken eggs in flexible polyvinyl isolators in either air or a 79% helium, 21% oxygen atmosphere. The metabolic activity of homogenates of eight-day embryos was studied by a modified Warburg technique. Some of the preparations were

exposed to X rays at a dose of either 1000 r or 2000 r and their respiratory activity was compared to the activity of paired, unirradiated controls. An increased metabolic rate was observed in embryos incubated in the helium-oxygen atmosphere and subjected to a minimal exposure to air. Embryos incubated in the same helium-oxygen atmosphere, but subsequently exposed to air, showed a significant depression in oxidative metabolism. Homogenates from either the air or helium-oxygen incubated eight-day embryos showed no change in respiratory activity after 1000-r exposure; however, there was a significant repression in metabolism in both groups after 2000-r X irradiation. (Author) D. P. F.

A65-22903
MOTION SICKNESS SYMPTOMATOLOGY OF LABYRINTHINE DEFECTIVE AND NORMAL SUBJECTS DURING ZERO GRAVITY MANEUVERS.
Robert S. Kellogg, Robert S. Kennedy, and Ashton Graybiel.
Aerospace Medicine, vol. 36, Apr. 1965, p. 315-318. 18 refs.

Comparison of motion sickness symptomatology observed for labyrinthine defective (L-D) and normal subjects flown through zero-gravity maneuvers. Six L-D subjects, ranging in age from 20 to 48 years, and 19 normal subjects, aged from 18 to 25 years, were tested on flights involving a shallow dive followed by pullup generating 2.5 G and a pushover into a ballistic trajectory with approximately 10 to 12 sec of weightlessness; recovery involved a pullup generating about 2.5 G, and a flight sequence consisted of 40 such maneuvers. The L-D's as a group were essentially symptom-free, whereas 64% of the normal subjects developed symptoms. The absence of functional labyrinthine mechanisms appreciably decreased and probably eliminated susceptibility to motion sickness during zero-gravity maneuvers. It would seem that if weightlessness is a factor in precipitating symptoms of motion sickness, it is not a strong factor. D. P. F.

A65-22904
AN INSTRUMENT FOR THE TOTALIZATION OF HEARTBEATS AND RESULTS OF ITS APPLICATION.
A. E. Brown, M. Friedman, and R. H. Rosenman (Mt. Zion Hospital, Harold Brunn Institute, San Francisco, Calif.).
Aerospace Medicine, vol. 36, Apr. 1965, p. 319-321. 5 refs.
Research supported by the Lockheed Independent Research Program.

Description of a portable instrument capable of measuring the total time a subject's heart beats in a given 24-hour interval, and applicable to studies concerned with the increased incidence of clinical coronary artery disease in people who exhibit a strong sense of time urgency. Instrumentation difficulties with acoustical and volumetric techniques determined the choice of the QRS complex of the electrocardiogram, with a waveform including only the higher frequencies. Such a waveform is desirable for counting purposes, since it essentially eliminates the undesirable low frequencies of gross motion potentials. The circuit diagram of the heartbeat totalizer appears in the text and consists of a two-stage amplifier followed by a monostable multivibrator. The latter's leading edge is differentiated and used to develop a current pulse of about 30 mw for a 10-ms duration, for each heartbeat. This pulse is used to operate a counting mechanism which consists of a modified wrist watch. Collection of the electrocardiographic signal is accomplished by a system of lead foil electrodes applied to the skin of the subject by tape. D. P. F.

A65-22905
EQUILIBRIUM AND WALKING CHANGES OBSERVED AT 5, 7-1/2, 10 AND 12 RPM IN THE REVOLVING SPACE STATION SIMULATOR.
Bernard D. Newsom, James F. Brady, and Guy J. Goble (General Dynamics Corp., General Dynamics/Astronautics, Life Science Dept., Aerospace Medicine Group, San Diego, Calif.).
Aerospace Medicine, vol. 36, Apr. 1965, p. 322-326. 13 refs.

Description of the experimental facilities provided by the Revolving Space Station Simulator, consisting of a room 7 x 8 x 14 ft suspended at an 18-ft radius by trunnions connected with a modified 220,000-g pound centrifuge, for testing the rotational tolerance of man in space. All rotating simulators on Earth are subject to the g artifact, and thus, it is difficult to assess a situation where the resultant force vector will be in the plane of spin. Former studies were performed in a room rotating about its center, and the radius of the facility was very small, thus magnifying the required velocity change when walking on any chord in the room. In the simulator described, the resultant inertial forces are normal to the floor, thus more closely simulating space environment. The standing test shows that considerable learning takes place in balancing ability within four hours, while the g force is perpendicular to the floor. Walking ability was similarly tested by having subjects walk toward the radius with eyes closed. The tolerance of individuals to rotation differs greatly, and selection of a crew with high rotation tolerances will be possible. D. P. F.

A65-22906
EFFECTS OF TRANSIENT WEIGHTLESSNESS ON BRIGHTNESS DISCRIMINATION.
W. J. White (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Advance Biotechnology Dept., Santa Monica, Calif.).
Aerospace Medicine, vol. 36, Apr. 1965, p. 327-331. 10 refs.
Contract No. AF 33(657)-11600.

Data relative to brightness discrimination thresholds of six semisupine, visually adapted subjects, under short periods (10-14 sec) of weightlessness, and under 1-G conditions. The target, viewed binocularly, subtended 1.5° and the background 2.6°. Three background luminance levels were used: 0.03, 0.28, and 30.0 ft-L. The contrast required to detect the target was found to be slightly, but consistently, lower under the weightless condition than under the control 1-G condition. Under the weightless condition, the contrast required to detect the target averaged 12.56% at 0.03 ft-L luminance, 6.49% at 0.28 ft-L background luminance, and 3.99% at 30.0 ft-L background luminance. The corresponding contrasts required under the 1-G condition averaged 15.14%, 7.05%, and 4.45%, respectively. (Author) D. P. F.

A65-22907
LARGE EXCURSION ROTARY TRACKING OF TARGET AND TARGET LIGHT IN A SPACE STATION SIMULATOR REVOLVING AT 7.5, 10.0 and 12.0 RPM.
J. F. Brady and B. D. Newsom.
Aerospace Medicine, vol. 36, Apr. 1965, p. 332-342. 44 refs.

Test data relative to a rotary tracking test performed on 24 professional engineers, sedentarily employed, within a space station simulator revolving at 7.5, 10.0, or 12.0 rpm, and aligned with the inertial resultant. Pretrained to asymptotic performance, they could be considered a select group only as to intelligence, motivation, and histories of low motion-sickness susceptibility. Exclusion of data on 11 of the subjects due to illness increased the selectivity of the results. It may be assumed, however, that the personal qualifications of a prospective astronaut for a similar task would be considerably greater. All rpm's showed minimal decrement, with rapid adaptation, following spinup and spindown of the simulator. Performance at 10.0 rpm was significantly better than at the other two rpm's. The observed perceptual-motor ability, within a test format designed to elicit untoward Coriolis effects, suggests that satisfactory hand-eye coordinations can be performed in space vehicles rotating at velocities substantially above the tentative 4-rpm ceiling. (Author) D. P. F.

A65-22908
EFFECT OF TRANSIENT WEIGHTLESSNESS ON BINOCULAR DEPTH PERCEPTION.
Edwin H. Sasaki (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Behavioral Sciences Laboratory, Wright-Patterson AFB, Ohio).
(Aerospace Medical Association, Annual Meeting, Miami, Fla., May 12, 1964.)
Aerospace Medicine, vol. 36, Apr. 1965, p. 343, 344.

Test data on the degree to which transient weightlessness affects visual acuity and depth perception, as conducted on five subjects, each of whom had passed the required flight physical examination and had completed both survival and altitude indoctrination courses. Details of the depth perception apparatus employed for the test are given. The nonparametric Friedman two-way analysis of variance by ranks was used to test the data. The transient gravity conditions of the zero-G parabola did not have a significant effect on depth perception. The 1-G control scores tended, however, to be the best, followed by the zero-G experimental scores in second place, and the 2-G entry tended to be slightly better than those obtained during the 2-G recovery, and the scores obtained during

the first part of the weightless period tended to be worse than those obtained during the latter part of the period. Thus, dramatic transitions tended to have adverse, but insignificant, effects on depth perception. D.P.F.

A65-22909
WHAT DOES SPACE FLIGHT TEACH US?
Jakob Eugster (Zurich, University, Zurich, Switzerland).
Aerospace Medicine, vol. 36, Apr. 1965, p. 345-350. 17 refs.
Translation.

Considerations relative to the new science of astrobiology, or that aspect of biology which has to do with the possibility of life on other planets, both within and without our solar system. Space medicine is that branch of research which deals with the biological conditions to which the space traveler will be exposed, effects of radiation, prolonged weightlessness, and the biotechnical know-how required to maintain life on another celestial body. Opportunities for testing astrobiological hypotheses include balloon observations, satellites, and astronomical research by observatories. Recently this field has been extended by radio telescopes, analytic studies of meteorites, and "Project Ozma," which is an attempt to establish radio contact with other life-forms existing on planets in other solar systems. The receiving station at Green Bank, W. Va., consists of a radiotelescope with a 26-m-diam. antenna. D.P.F.

A65-22910
FREQUENCY OF SHIFT ROTATION AT AIR TRAFFIC CONTROL FACILITIES AND INCIDENCE OF STRESS-RELATED SYMPTOMS.
G. T. Hauty, D. K. Trites, and W. J. Berkley.
Aerospace Medicine, vol. 36, Apr. 1965, p. 350-356.

Analysis of response data relative to a symptom checklist, as part of a survey designed to evaluate the differential effects upon job-related health and well-being that might be attributable to the different shift rotation schedules employed by various Air Traffic Control (ATC) facilities. Three hundred journeymen and assistant controllers were selected as volunteer subjects to complete a biomedical inventory daily, for a period of 90 consecutive days. The inventory elicited information relative to health, morale, behavioral habits, and side effects of medications. Of the 300 subjects, 209 fulfilled the reporting requirements of the 90 days. For one of the indices of information - stress-related symptoms - analyses of the data revealed that: (1) facilities did differ to a significant degree in the incidence of reported symptoms but these differences could not be attributed to shift rotation schedules, and (2) eight hours or less between two successive shifts occasioned the highest incidence of reported symptoms and more than 24 hours between shifts the next highest. (Author) D.P.F.

A65-22911
BIOCHEMICAL MEASURE OF IMPACT STRESS IN CHIMPANZEES.
E. J. Hawrylewicz and W. H. Blair (Illinois Institute of Technology, Research Institute, Life Sciences Div., Chicago, Ill.).
Aerospace Medicine, vol. 36, Apr. 1965, p. 369-371. 9 refs.

Test data for five chimpanzees subjected to various G forces from 54 to 180. Serum lactic dehydrogenase (LDH) and LDH isoenzymes were determined both before and also one hour, 24 hours, and seven to eleven days after the G stress. Total LDH increased two- to threefold one hour after the stress and was still elevated 24 hours later, with a return to normal limits seven to eleven days later. LDH isoenzymes were abnormal one hour after G stress, with a decrease in bands one and two and marked elevation in bands four and five. This shift in isoenzymes was still apparent 24 hours later. At the preautopsy period (seven to eleven days after stress) the abnormal enzyme pattern shifted to an increase in bands one and two of the three chimpanzees alive at this time. The alternation in serum LDH and LDH isoenzymes appears to be the result of impact stress. The change in isoenzyme pattern seven to eleven days later probably reflects the adaption of the organism to the initial stress and development of postimpact pathology.
(Author) D.P.F.

A65-22928 #
MAN AT THE THRESHOLD OF SPACE [CZŁOWIEK NA PROGU KOSMOSU].
Jerzy Grzegorzewski.
Institut Lotnictwa, Biuletyn Informacyjny, Apr. 12, 1965, p. 6-13.
18 refs. In Polish.

Review of physical and psychophysiological tests in the Soviet Union for training astronauts and selecting future spaceship pilots. The requirements set for an astronaut are outlined, and the effect of zero-G conditions on the human organism are examined. The principal results obtained during past Soviet space flights are noted. Photographs showing the astronauts Titov, Popovich, and Nikolaev during tests are included. V.P.

A65-22954 #
INTERPLANETARY MISSION LIFE SUPPORT SYSTEM.
E. S. Mills and R. L. Batterson (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Advance Biotechnology Dept., Santa Monica, Calif.).
American Society of Mechanical Engineers, Aviation and Space Conference, Los Angeles, Calif., Mar. 14-18, 1965, Paper 65-AV-33. 22 p. 17 refs.
Members, $0.50; nonmembers, $1.00.

Results of a study for selecting the various life-support and environmental-control subsystems to be used on an interplanetary mission. In order to select the subsystems, a preliminary study was conducted of man's activities during the flight. The activity levels determined the energy expenditures and metabolic exchanges required. These data were applied to various subsystems to obtain a closed oxygen-water cycle. The material presents the system efficiency required to close the cycles. Present concepts are stressed, but allowance is made for improvements during the long development period prior to launch. Emphasis is placed on the oxygen-recovery system and the water-management system. Extensive integration of these systems with man's by-products and with each other is required to minimize stored consumables. The food cycle is the only open cycle system included. The influence of its penalty on total system weight is indicated. Other systems discussed include temperature conditioning, waste management, and atmospheric conditioning. (Author) W.M.R.

A65-22959 #
CHEMICAL ASPECTS OF URINE DISTILLATION.
David F. Putnam (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.).
American Society of Mechanical Engineers, Aviation and Space Conference, Los Angeles, Calif., Mar. 14-18, 1965, Paper 65-AV-24. 14 p. 10 refs.
Members, $0.50; nonmembers, $1.00.

Description of certain treatment and processing methods which make it possible to distill from human urine a highly pure drinking water. The methods include the use of chemical additives to stabilize the major contaminants, both gas and liquid-phase odor adsorption, and distillate sterilization techniques. The information reported is derived from experiments with a breadboard air evaporation system in which approximately 250 liters of urine were processed. (Author) W.M.R.

LC ENTRIES

A65-80872
PULMONARY DIFFUSION AND ANTI-G SUITS [DIFFUSION PULMONAIRE ET VETEMENT ANTI-G].
J. Demange, C. Jacquemin, P. Varene, and J. Timbal (Centre d'Essais en Vol, Lab. de Méd. Aérospatiale, Bretigny-sur-Orge (Seine-et-Oise), France).
Revue de Medecine Aeronautique, vol. 3, Oct.-Nov. 1964, p. 6-8. 13 refs. In French.

The measurement of pulmonary capacity with carbon monoxide permits the functional exploration of pulmonary capillary circulation. This study is of value in aerospace medicine because pulmonary capillary circulation at low pressure is directly subjected to mechanical agressions (transverse and longitudinal accelerations, explosive decompression, positive pressure breathing, etc.) Compression by the anti-g suit is also one of these agressions. This preliminary study reveals a normal value of pulmonary diffusion capacity for four subjects wearing anti-g suits after three minutes of inhaling a carbon monoxide mixture and leads to the hypothesis that a certain adaptation takes place within the pulmonary capillary circulation. Additional study is needed of volume time and pulmonary capillary output.

A65-80873
NASOSINUSAL ALLERGY AND CIVIL AVIATION FLIGHT PERSONNEL [ALLERGIE NASO-SINUSIENNE ET PERSONNEL NAVIGANT DE L'AVIATION CIVILE].
P. Pialoux and A. Hustin (Med. Serv., Air France, Paris; and Sabena, Brussels, Belgium).
Revue de Médecine Aéronautique, vol. 3, Oct.-Nov. 1964, p. 11-12. In French.

Nasosinusal allergy generally originates from barotraumatic phenomena in civilian flying personnel. Discussed are its clinical manifestations and diagnosis. Flying personnel are especially susceptible to nasosinusal allergy because they are exposed to abrupt climatic changes, modifications in nutrition, constant time changes in relation to normal life, and dry air, especially in jet aircraft. Pilot candidates presenting overinfected nasosinusal allergy are not medically acceptable for training. If allergy is in the first stage (acute, periodic or aperiodic coryza, drainage, etc.) a decision for acceptance or rejection is difficult to make. During the periodical medical examination of personnel, easily treated seasonal coryza is not considered of importance to incapacitate the flyer. However, other forms of allergy resulting from serious barotraumatic accidents necessitate the temporary grounding of personnel. During this period, treatment is given along with medical examination. If these accidents recur when the person is returned to flight duty, there is the possibility that his license may be suspended.

A65-80874
PROTECTION AGAINST ACCELERATIONS IN A PILOT WEARING A FLIGHT SUIT [PROTECTION CONTRE LES ACCELERATIONS D'UN PILOTE EQUIPE D'UN SCAPHANDRE AERIEN].
H. Seris, R. Auffret, and M. Beaussant.
Revue de Médecine Aéronautique, vol. 3, Oct.-Nov. 1964, p. 14-16. In French.

Two pilots were exposed in 3 stages to 3, 4, and 5 g for 45 seconds respectively, with or without the French flight suit DT1-101-B and the anti-g trousers E.F.A.-ARZ type 817. The pilots were seated in a Martin-Baker ejection seat in an aircraft cabin situated on the arm of a centrifuge. Total duration of the test was 160 seconds. The following parameters were measured: base time, systolic arterial pressure, accelerations, interdigital pulse, and respiratory rhythm. After the test a graphic analysis was made of the acceleration profiles and evolution of arterial pressure with and without protection. Good protection was given to the pilot by the anti-g trousers placed over the flight suit. Adoption of this mode of clothing is under consideration.

A65-80875
PHYSIOLOGICAL DATA RESULTING FROM EXPERIMENTS WITH THE "VERONIQUE" ROCKET IN OCTOBER 1963 [BILAN PHYSIOLOGIQUE DE L'EXPERIMENTATION REALISEE A L'AIDE DE FUSEES "VERONIQUE" EN OCTOBRE 1963].
R. Grandpierre, P. Buser, R. Angiboust, R. Brice, B. Cailler, G. Chatelier, J. Ginet, J. A. Perroche, F. Soret, and A. Vauzelle (Centre d'Enseignment et de Rech. de Méd. Aéron., Paris, France).
Revue de Médecine Aéronautique, vol. 3, Oct.-Nov. 1964, p. 17-19. In French.

Two cats with fixed implanted cranial electrodes were placed aboard two Veronique rockets on October 18 and 24, 1963. Registration of various physiological parameters demonstrated that the phase of propulsion and the period of weightlessness (5 minutes) were well tolerated. At the moment of propulsion a high vigilance level and acceleration in cardiac and respiratory rhythm was observed. During the weightless period, a state of calm appeared and tracing showed a lowering in vigilance with a tendency to sleep. The primary somesthetic path did not appear to be disturbed and the evoked potentials showed only slight physiological variations. During the phase of reentry into the atmosphere important vegetative disorders (extrasystolic bigeminism and polypnea) were found. It appears that for the cat exposed to a short period of weightlessness (5 minutes), and for the parameters studied, the central nervous system does not show significant modification of its spontaneous activity or of its evoked activity. Photographs are included of the cat during training and in the container.

A65-80876
PHYSIOPATHOGENIC STUDY OF SPINAL FRACTURES AFTER EJECTION [ETUDE PHYSIOPATHOGENIQUE DES FRACTURES DU RACHIS DE L'EJECTION].
R. P. Delahaye, H. Mangin, H. Seris, and R. Auffret (H.M.I. Dominique Larrey, Versaille, S.-et-O.; and C.E.V., Bretigny-sur-Orge, France).
Revue de Medecine Aeronautique, vol. 3, Oct.-Nov. 1964, p. 39-48. 52 refs. In French.

Following a description of the spinal morphology, with figures, the pathogenic theories for dorsolumbar spinal fractures are considered. These are distinguished into three varieties of fractures according to the direction of shock: (1) vertical compression of the spine; (2) posterior-superior force on the spine; and (3) posterior force acting perpendicularly on the spine. Of the three types, vertical compression is the most significant and causes most of the ejection lesions which occur in the dorsolumbar hinges (D11, D12, L1, L2) usually after defective contact with the ground, and in other high dorsal areas. Reviewed are Rieunau's studies on vertebral resistance with his anatomopathological classification of dorsolumbar vertebral fractures based on posterior wall injury. Explanatory diagrams are included. Also reviewed are experiments of various flight test centers in the United States and in Bretigny, results of a radiological investigation of subjects seated in an ejection seat, and results observed by Swedish and American workers involved in the pathogenesis of spinal fractures due to ejections.

A65-80877
HUMORAL TRANSMISSION OF SLEEP AND WAKEFULNESS. III. HEMODIALYSIS OF ACTIVATING HUMORS DURING STIMULATION OF THE MIDBRAIN RETICULAR SYSTEM.
L. Hosli and Marcel Monnier (Basel U., Physiol. Inst., Switzerland).
Pflügers Archiv für die gesamte Physiologie des Menschen und der Tiere, vol. 283, 1965, p. 17-25. 14 refs. Ciba-Stiftung and Hoffmann-La Roche A. G. supported research.

Dialysis of cerebral venous blood was performed during repetitive stimulation of the reticular activating system of the rabbit. The dialyzate was injected intravenously into a normal animal. Alterations in behavior and EEG were recorded and analyzed. In control experiments dialyzate was injected into normal recipients from animals in which sham-stimulation of the activating reticular system had been performed. Within 5 minutes after injection of 20 ml of dialyzate from an alert donor, recipient animals revealed activated behavior with various rhinodiencephalic symptoms (explorative behavior, sniffing, lapping, grooming). Concurrently, a typical arousal pattern appeared in the EEG, with desynchronized activities in the cortex and abundant theta rhythms in the hippocampus. Control animals which received dialyzate from sham-stimulated donors also showed activation of behavior and electrical brain activity, but less pronounced and mostly with rhinencephalic symptoms. These results suggest that activation of rhinodiencephalic type observed in the recipient after injection of dialyzate from a stimulated donor is due to some factors released in the donor's blood and extracted by dialysis.

A65-80878
ON THE BIOSYNTHESIS OF NICOTINIC ACID IN STREPTOMYCETES, ALGAE, PHYCOMYCETES, AND YEAST [ZUR BIOSYNTHESE DER NICOTINSAURE IN STREPTOMYCETEN, ALGEN, PHYCOMYCETEN UND HEFE].
Franz Lingens and Peter Vollprecht (Tübingen U., Chem. Inst., Biochem. Abt., West Germany).
Hoppe-Seyler's Zeitschrift für Physiologische Chemie, 1964, vol. 339, p. 64-74. 15 refs. In German.

Studies with ^{14}C tryptophan showed that nicotinic acid is synthesized from tryptophan in Streptomyces antibioticus, Cyanidium caldarium, Karlinia rosea, and Saccharomyces cerevisiae. Tryptophan is not converted to nicotinic acid in Streptomyces venezuelae, Anacystis nidulans, Chlorella pyrenoidosa, and Saprolegnia ferax. A parallel exists insofar as microorganisms, which synthetize lysine via α-amino-adipic acid, form nicotinic acid from tryptophan. When, however, lysine is synthesized via α,ε-diamino-pimelic acid, nicotinic acid is generally not formed from tryptophan.

A65-80879
INTEROCEPTIVE AFFERENT EFFECT UPON THE VOMITING CENTER EXCITATION DURING MOTION SICKNESS [VLIIANIE INTEROTSEPTIVNOI AFFERENTATSII NA VOZBUDIMOST' RVOTNOGO TSENTRA PRI BOLEZNI DVIZHENIIA].
I. D. Pestov.
Izvestiia Akademii Nauk SSSR Seriia Biologicheskaia, no. 5, Sep.–Oct. 1964, p. 690–694. 8 refs. In Russian.

The mechanism of the interoceptive, afferent stimulation of the vomiting center was studied in dogs, intact or with the labyrinth removed, which were subjected to irregular rotation on a table. The animals were given subcutaneous injections of a 0.05% apomorphine solution. At 10 rpm the excitation of the vomiting center increased, essentially because of stimulation of the vestibular apparatus. At higher rates, an extralabyrinthine influence was noted, apparently from stimulation of interoceptors of the abdominal cavity. This influence could be suppressed by intraperitoneal injection of 0.5% novocain solution, 2 to 3 weeks before the exposure to rotation.

A65-80880
NITROGEN METABOLISM DURING SYNCHRONOUS GROWTH OF CHLORELLA PYRENOIDOSA. I. PROTEIN AMINO ACID DISTRIBUTION.
T. A. Hare and R. R. Schmidt (Va. Polytech. Inst., Dept. of Biochem. and Nutr., Blacksburg).
Journal of Cellular and Comparative Physiology, vol. 65, Feb. 1965, p. 63–67. 17 refs.
Grants PHS GM-12042-01; NSF GB-1960.

Total cellular-N, acid soluble-N, lipid pulse chlorophyll-N, and the levels of the individual amino acids were measured during synchronous growth of a high temperature strain, 7-11-05, of Chlorella pyrenoidosa. Total cellular-N increased exponentially except for a small but reproducible deviation from log-linearity which occurred at approximately the middle of the 14-hour synchronous growth cycle. Although the level of acid soluble-N (as % of total cellular-N) exhibited definite periodism during synchronous growth, the amount of nitrogen in this pool was small (approximately 4% to 8%). Lipid plus chlorophyll-N showed only slight fluctuations during cellular development; however, the trend followed that previously observed for phospholipid-P. The levels of the protein amino acids were expressed on a mole-percentage basis of the total protein amino acids. The level of most of the protein amino acids remained essentially constant during the course of synchronous growth. The levels of the basic and acidic amino acids as well as alanine exhibited more significant periodism than the other protein amino acids. The total protein amino acid-N level comprised approximately 63% of the total cellular-N throughout cellular development.

A65-80881
FEEDBACK AND NOISE-SIGNAL DETECTION AT THREE PERFORMANCE LEVELS.
Richard A. Campbell (V.A. Reg. Office, Atlanta, Ga.)
Journal of the Acoustical Society of America, vol. 37, Mar. 1965, p. 434–438. 3 refs.

The effect of the presence or absence of feedback, or immediate positive reinforcement, was studied at 3 performance levels: 88%, 75%, and 62% correct. The BUDTIF (Block Up and Down, Two-Interval-Forced choice) experimental procedure was utilized. Signal-to-noise ratios were varied in a 104-trial run (about 7 min) so as to maintain the desired performance level. The noise was set to 35 dB sound level. One group of naive subjects was used; each subject was presented one of the six conditions of performance level and feedback for five consecutive runs. Another group of experienced subjects was presented with all six conditions in each of six one-hour sessions. Threshold signal-to-noise ratios, intrarun variability of levels utilized, the time per run, and interrun variability were determined. No statistically significant and systematic effect of feedback was found.

A65-80882
HEARING-LOSS TREND CURVES AND THE DAMAGE-RISK CRITERION IN DIESEL-ENGINEROOM PERSONNEL.
J. D. Harris (U.S. Naval Submarine Med. Center, Groton, Conn.)
Journal of the Acoustical Society of America, vol. 37, Mar. 1965, p. 444–452. 13 refs.

Several hundred young men were given careful audiometry before beginning duty in noise of 105 to 110 dB sound pressure level at one or more of the octaves 300 to 600, 600 to 1200, and 1200 to 2400 cps. These men were then given the same audiometric examination at intervals up to five years. Less than 15% of ears had permanent threshold shifts (PTS) of more than 20 dB at any frequency. Trend curves extrapolated over log time predict a median PTS of 8 dB at 4 kc/sec for 10 years' exposure. The PTS actually found was thus 20 dB less than predicted by the ASA Z-24 Committee report; the 4-kc/sec TTS_2 index would thus vastly overpredict both the actual PTS of 8 dB and the Z-24 Committee prediction of 22 dB. Ear defenders as actually worn by this population reduce median PTS by no more then 5 dB. It is concluded that a damage-risk criterion of 100 dB SPL at any of the relevant octaves would be conservative protecting at least 85% of young healthy ears from PTS of over 20 dB at any frequency.

A65-80883
RETINAL VASCULAR RESPONSE TO HYPERBARIC OXYGENATION.
Herbert A. Saltzman, Leonard Hart, Herbert O. Sieker, and Edward J. Duffy (Duke U. Med. Center; and V. A. Hosp., Med. Illustration Serv., Durham, N. C.)
(American Medical Association, 113th Annual Convention, San Francisco, June 25, 1964).
JAMA, vol. 191, Jan. 25, 1965, p. 114–116. 11 refs.
N. C. Heart Assoc., Chapel Hill, supported research.
Grants HEW HE-07896-02, HEW HE-01596-08S1, and HEW HE-07563-02.

Hyperbaric oxygenation affects central nervous system function and the cerebral circulation. The optic fundus permits direct visualization of the retinal fraction of the cerebral circulation. For this reason, photographs of the optic fundus were obtained in 8 normal volunteers breathing air or oxygen at 1 to 3.72 atm of absolute pressure during quiet respiration and hyperventilation. Hyperbaric oxygenation resulted in marked attenuation of both arterioles and venules, and the smaller retinal vessels disappeared completely. In addition, the normal color difference between veins and arteries was lost. These changes occurred during the first five minutes of oxygen respiration and were largely reversed by one minute of air breathing. Hyperventilation, with associated hypocapnia, was not associated with significant decreases in vessel caliber. These studies indicate a major vasoconstrictor action of oxygen on the retinal circulation. The arterial color of the retinal veins during hyperbaric oxygenation suggests that there is a significant increase in retinal tissue oxygen content.

A65-80884
THE KINETICS OF THE OXYGEN CONSUMPTION AT THE ONSET OF MUSCULAR EXERCISE IN MAN.
R. Margaria, F. Mangili, F. Cuttica, and P. Cerretelli (Milan U., Ist. di Fisiol. Umana, Italy).
Ergonomics, vol. 8, Jan. 1965, p. 49–54. 12 refs.

The O_2 uptake process at the beginning of exercise in man can be described as a process of an exponential type related to the intensity of the exercise. Its speed constant has the same value both for work performed in aerobic conditions as for very strenuous exercise involving an energy expenditure higher than can be maintained on the O_2 consumption (anaerobic conditions). The half reaction time of this process is about 30 sec. These results support the hypothesis that the intracellular oxidation processes are coupled with the splitting and resynthesis of the high energy phosphate processes in muscle. The speed of oxidative processes in muscle does not seem to be a limiting factor to the oxygen uptake in muscular exercise. The maximum O_2 consumption level is presumably set by the capacity of the O_2 transport from the lungs to the active tissues.

A65-80885
ON INCREASING THE SENSITIVITY OF MEASURES OF PERFORMANCE.
E. C. Poulton (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Ergonomics, vol. 8, Jan. 1965, p. 69–76. 34 refs.
Med. Res. Council supported research.

This paper illustrates some of the methods which have been used to increase the sensitivity of measures of performance: adjusting the difficulty of the task; saturating the man's channel capacity by giving him an additional task to perform; using an unfamiliar task; measuring variability instead of mean performance; selecting specific events on which to make measurements; examining component rather than overall measures; and channeling two dimensions of variability into one. Finally it raises a methodological difficulty in comparing the results of performance tests which may differ in sensitivity.

A65-80886
LABORATORY STUDIES OF REPETITIVE WORK. SKILLS INVOLVED IN READING METERS.
Gösta Ahlmark and K. F. H. Murrell (Welsh Coll. of Advan. Technol., Unit for Res. on Human Performance, Great Britain).
Ergonomics, vol. 8, Jan. 1965, p. 89–92.

A study was conducted determining the ability to make decisions in a human operator reading a meter with a moving needle. The results confirm observations made in industry that an operator can learn to make decisions before the needle completes its excursion. The skill can be acquired through work experience or through training. This ability must be considered in setting up work-time tables. It can be acquired with more ease and speed if the meter is designed so that the terminal positions (and hence the needle speeds) are widely separated and the needle movements without recoil.

A65-80887
THE MOON: NEXT ASTRONAUTICAL OBJECTIVE [LA LUNA: PROXIMO OBJETIVO ASTRONAUTICO].
P. Mateu Sancho.
Barcelona, Plaza and Janes, S. A., 1964, 293 p. 20 refs. In Spanish.

This is a popular but well documented and richly illustrated, concise review of human knowledge and lore about the moon throughout the ages and of the present status and future prospects of the lunar space travel program. Lunar climate, surface features, and the possibility of life on the moon are discussed in separate chapters. The last section of the book is devoted to a survey of the Russian and American lunar probes and proposed lunar expeditions.

A65-80888
REFLEX RESPONSE TO CLICKS OF CAT'S TENSOR TYMPANI DURIN' SLEEP AND WAKEFULNESS AND THE INFLUENCE THEREON OF THE AUDITORY CORTEX.
W. Baust and G. Berlucchi (Pisa U., Ist. di Fisiol.; and C.N.R., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).
Archives Italiennes de Biologie, vol. 102, Nov. 10, 1964, p. 686–712. 42 refs.
Grant PHS-NB-02990-03.

The electromyographic response of the tensor tympani muscle to clicks of 55 to 90 dB intensity in waking cats is characterized by an initial discharge, a silent period, and a late discharge. The two discharges are considered part of an acoustic reflex. The silent period coincides with a similar block of EMG activity in the neck muscles, and is presumed to be due to an active inhibitory process. Repetitive stimulation results in habituation of the tensor tympani response, which, however, is disrupted by other stimuli or a change in the rate of clicks. The tensor tympani reflexes are reduced in synchronized sleep but retain their normal shape during the desynchronized phase of sleep. Attentive wakefulness is characterized by a longer duration of the late discharge. Chloralose or Nembutal anesthesia, ablation of the cerebral cortex, and bilateral ablation of the auditory cortical area A-I reduce the tensor tympani reflex. It is concluded that the tensor tympani reflex is influenced strongly by corticofugal discharges originating from the auditory area A-I.

A65-80889
THE ORIGIN AND EVOLUTION OF ATMOSPHERES AND OCEANS.
Peter J. Brancazio and A. G. W. Cameron.
Edited by Peter J. Brancazio and A. G. W. Cameron (Goddard Inst. for Space Studies, New York, N. Y.)
(Conference at Goddard Institute for Space Studies, National Aeronautics and Space Administration, New York, April 8–9, 1963, Proceedings).
New York, John Wiley and Sons, Inc., 1964, xii +314 p. (See A65-80890 to A65-80891). $12.50.

Various aspects of the origin and evolution of planetary atmospheres and oceans as discussed by a group of physicists, astronomers, and earth scientists on April 8 and 9, 1963, at the Goddard Institute for Space Studies, are presented. Included are the following: (1) geologic history of sea water, (2) convection in the earth's mantle, (3) degassing of argon and helium from the earth, (4) comments on the outgassing of the earth, (5) on the chemical evolution of the terrestrial and cytherean atmospheres, (6) the history of growth of oxygen in the earth's atmosphere, (7) the escape of helium from the earth's atmosphere, (8) primordial rare gases in meteorites, (9) isotopic analysis of xenon, (10) interpretation of xenon measurements, (11) outgassing processes on the Moon and Venus, (12) observations of water vapor on Mars and Venus, (13) the atmosphere of Mercury, (14) the atmosphere of Venus, (15) the atmosphere of Mars, (16) are the interiors of Jupiter and Saturn hot?, and (17) the atmosphere of Jupiter. A subject index is included.

A65-80890
ON THE CHEMICAL EVOLUTION OF THE TERRESTRIAL AND CYTHEREAN ATMOSPHERES.
Heinrich D. Holland (Princeton U., N. J.)
IN: THE ORIGIN AND EVOLUTION OF ATMOSPHERES AND OCEANS.
(Conference at Goddard Institute for Space Studies, National Aeronautics and Space Administration, New York, April 8–9, 1963, Proceedings).
Edited by Peter J. Brancazio and A. G. W. Cameron.
New York, John Wiley and Sons, Inc., 1964, p. 86–101. 11 refs. (See A65-80889).

The history of the terrestrial atmosphere as related to accepted data concerning the chemical composition of the atmosphere of Venus is presented. Included are data of the partial pressure of oxygen in the atmosphere as function of time throughout the history of the Earth. The influence of the latter on partial pressures of N_2, A Ne, Kr, Ke, CO_2, and SO_2 is described. The presence of water on the Earth's surface must be related to the inclusion of water in the solid part of the Earth during accretion, most probably as ice and as water of hydration in hydrated silicates. The relative water content of accreted planetary material is therefore surely related to the temperature during accretion. It seems likely that the temperature during accretion in the orbit of Venus was higher than that in the Earth's orbit; the water content of Venus could therefore be considerably smaller than that of the Earth. The mean depth of the Earth's oceans is about 3000 meters and is a function of the water content of the lithosphere and of the degree of degassing of the planet. If the water content of Venus were three to four orders of magnitude smaller than that of Earth, the depth of the Cytherean "oceans" or their volatized equivalent would be negligible even if Venus is more thoroughly outgassed than the Earth. The concentrations of other volatiles in Venus would similarly be dependent on the accretion temperature of the planet.

A65-80891
OBSERVATIONS OF WATER VAPOR ON MARS AND VENUS.
A. Dollfus (Observatoire de Paris, Meudon, France).
IN: THE ORIGIN AND EVOLUTION OF ATMOSPHERES AND OCEANS.
(Conference at Goddard Institute for Space Studies, National Aeronautics and Space Administration, New York, April 8–9, 1963, Proceedings).
Edited by Peter J. Brancazio and A. G. W. Cameron.
New York, John Wiley and Sons, Inc., 1964, p. 257–268. (See A65-80889).

Descriptions of new measurements giving positive identification of water on both Venus and Mars are presented. Observations were made from balloons during flight and from high mountains. Data were obtained by making photometric comparisons of the observations on Venus and Mars with those on the Sun or Moon. A final value of 1.5×10^{-2} g/cm^2 of water vapor was calculated to be about 1×10^{-2} g/cm^2, with a probable error of a factor of 2. Activities of an international program for photographing Venus in the ultraviolet are described.

A65-80892
FLIGHT AND PHYSICAL TRAINING [POLETY I FIZICHESKAIA TRENIROVKA].
B. Evstaf'ev.
Aviatsiia i Kosmonavtika, no. 1, Jan. 1965, p. 44–47. In Russian.

The extreme mental concentration and the limitations in body movements during flight missions produce muscular fatigue, which may lower the degree of performance of the crew members. In order to train the body of an airman to withstand such stresses, a series of preflight physical exercises have been designed. They consist of certain types of calisthenics and performance on different types of gym apparatus, in order to develop the muscles of the arms, legs, and back. In addition, isometric exercises are used to improve muscle tonus, respiration, and posture.

A65-80893
MOTION SICKNESS SYMPTOMATOLOGY OF LABYRINTHINE DEFECTIVE AND NORMAL SUBJECTS DURING ZERO GRAVITY MANEUVERS.
Robert S. Kellogg (AF Systems Command, Aerospace Med. Div., Wright-Patterson AFB, Ohio), Robert S. Kennedy, and Ashton Graybiel (U.S. Naval School of Aviation Med., Pensacola, Fla.)
Aerospace Medicine, vol. 36, Apr. 1965, p. 315–318. 18 refs.

Labyrinthine defective (L-D) and normal subjects were flown through zero-gravity maneuvers and their motion sickness symptomatology observed. The L-D subjects showed no signs of motion sickness, whereas 64% of the normal subjects developed symptoms. The absence of functional labyrinthine mechanisms appreciably decreased, and probably completely eliminated susceptibility to motion sickness during zero-gravity maneuvers.

A65-80894
LARGE EXCURSION ROTARY TRACKING OF TARGET AND TARGET LIGHT IN A SPACE STATION SIMULATOR REVOLVING AT 7.5, 10.0 and 12.0 RPM.
J. F. Brady and B. D. Newson.
Aerospace Medicine, vol. 36, Apr. 1965, p. 332–342. 44 refs.

Twenty-four professional engineers, sedentarily employed, volunteered as test subjects to perform a rotary tracking test within a space station simulator revolving at 7.5, 10.0 or 12.0 rpm and alined with the inertial resultant. Pretrained to asymptotic performance, they could be considered a select group only as to intelligence, motivation, and histories of low motion sickness susceptibility. Exclusion of data on 11 of the subjects due to illness increased the selectivity of the results. It may be assumed, however, that the personal qualifications of a prospective astronaut for a similar task would be considerably greater. All rpm's showed minimal decrement, with rapid adaptation, following spinup and spindown of the simulator. Performance at 10.0 rpm was significantly better than at the other two rpm's. This observed perceptual-motor ability, within a test format designed to elicit untoward Coriolis effects, suggests that satisfactory hand-eye coordinations can be performed in space vehicles rotating at velocities substantially above the tentative 4 rpm ceiling.

A65-80895
FREQUENCY OF SHIFT ROTATION AT AIR TRAFFIC CONTROL FACILITIES AND INCIDENCE OF STRESS-RELATED SYMPTOMS.
G. T. Hauty, D. K. Trites, and W. J. Berkley (FAA, Oklahoma City, Okla.)
Aerospace Medicine, vol. 36, Apr. 1965, p. 350–356.

From 6 enroute and 6 terminal air traffic control facilities selected on the basis of difference between shift rotation schedules and high traffic volume, 300 journeymen and assistant controllers were selected as volunteer subjects to complete a biomedical inventory daily for a period of 90 consecutive days. The inventory elicited information relating to health,

morale behavioral habits, and side effects of medications. Of the 300 subjects, 209 fulfilled the reporting requirements of the 90 days. For one of the indices of information—stress-related symptoms—analyses of the data revealed that: (1) facilities did differ to a statistically significant degree in the incidence of reported symptoms, but these differences could not be attributed to shift rotation schedules; and (2) 8 hours or less between two successive shifts occasioned the highest incidence of reported symptoms and more than 24 hours between shifts the next highest.

A65-80896
PERSONAL HABITS AMONG USAF AIRCREW MEMBERS: A SURVEY.
Jefferson C. Davis and David H. Beyer (School of Aerospace Med., Aerospace Med. Div., Brooks AFB, Tex.)
Aerospace Medicine, vol. 36, Apr. 1965, p. 357–360. 9 refs.

A survey was conducted among 1960 flying personnel at 98 United States Air Force bases to obtain information on certain personal habits. One-half of the questionnaires were anonymous and the remainder required identification. The response rate was equal in the two groups (55.5%) and no significant differences were found in the habits reported by them. One percent of the men took unacceptable self-medication while flying. Fifty-one point five percent of the men are cigarette smokers. On the average day 74.8% of the men had either no alcohol intake or the equivalent of 2 drinks or less. Of 125 pilots 16.8% ate no breakfast and 32% had a coffee, juice, and roll breakfast only on a day when they were flying.

A65-80897
GENERAL AND COMPARATIVE BIOLOGY OF EXPERIMENTAL ATMOSPHERES AND OTHER STRESS CONDITIONS: EXPERIMENTS WITH THE TURTLE, PSEUDEMYS SCRIPTA-ELEGANS.
Olive W. Daly, Gwendylon Davis, and S. M. Siegel (Union Carbide Res. Inst., Tarrytown, N.Y.)
Aerospace Medicine, vol. 36, Apr. 1965, p. 363–368. 8 refs.

Turtles, Pseudemys scripta-elegans and Graptemys pseudogeographica, were exposed to a variety of environmental stress conditions. Survival, locomotion, general reactions, respiration, and hematological changes were used to determine the biological effects of these conditions. Turtles respond to atmospheric modification in a rather unique manner not at all consistent with the mammalian pattern. Although their anaerobic survival period was brief they were able to survive for long periods at low oxygen concentration at reduced pressures. They showed an ability to adapt to a range of atmospheres varying from anaerobic to those containing 100% oxygen, to high and low atmospheric pressures, ultraviolet radiation and reduced temperatures. Such adaptability makes the turtle an excellent specimen for stress experimentation.

A65-80898
PHYSICAL EFFORT AS MAIN CAUSE OF HEAT-STROKE.
S. Shibolet, T. Gilat, and E. Sohar (Tel-Hashomer Hosp., Dept. of Med. and Climatic Res. Unit, Israel).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium Sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 33–38. 23 refs.

Clinical observations of 20 cases of heat stroke occurring during heavy physical effort in healthy, young men acclimatized to physical effort in a hot environment are presented. Responses of acclimatized men marched under conditions of varying weight, heat, and workload are also presented. Evidence obtained from both areas of investigation indicates that heat stroke may occur in the presence of copious sweating and an intact heat dissipation mechanism. This occurs as the result of excessive heat production, during strenuous physical effort, even when the external heat load is moderate.

A65-80899
OBSERVATIONS ON DEHYDRATION AND ECCRINE SWEATING.
F. Sargent II, W. K. Brown, A. T. Pessa, J. Waligora, and K. P. Weinman (Ill. U., Dept. of Physiol. and Biophys., Urbana).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 115–119.
Grant NIH A-4210.

Two metabolically controlled experiments were undertaken to study the effect of dehydration on the function of the eccrine sweat gland. Four physically fit young males served as subjects. In experiment I, the subjects were maintained for 1 week on a nutritionally adequate diet with measured water intake; in experiment II, the subjects subsisted on 1000 kcal per day of an all carbohydrate diet, 4.5 g per day of sodium chloride, and measured water. On the eighth day of both experiments the subjects marched for 6 hours on a motor-driven treadmill at 3.5 mph in a chamber (dry-bulb temperature, 33°C; wet-bulb temperature, 30° C). Ten-minute rests were allowed at the end of each 50-minute walk. Total body and capsule sweat rate; rectal, capsule, and medial thigh skin temperatures; and number of active sweat glands on forearm were measured at regular intervals. Measurements were taken also for the responses of the eccrine sweat glands to an intradermal injection of 80μg of acetyl-β-methylcholine in saline. The results of this study suggest the conclusion that when the exogenous and endogenous heat load is such that an adequately hydrated but unacclimatized man can be expected to sweat at rates between 500 and 1100 g per hour, a deficit of body water greater than 2.5 liters may reduce the sweat rate of this man by some 100 to 150 g per hour. This deficit is no greater even when the body water deficit approaches 10 liters.

A65-80900
THE PREVENTION OF VOLUNTARY DEHYDRATION.
E. Sohar, J. Kaly, and R. Adar (Tel-Hashomer Hosp., Climatic Res. Unit, Israel).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 129–135. 10 refs. Grant Ford Found., Israel, F-3.

In an experimental march from Eilat to Metulla which took place during August 1959, 19 young men covered 17 miles per day each carrying a load of 35 lb. An effort was made to prevent voluntary dehydration during the marching-period and to maintain daily fluid balance. A negative daily fluid balance was prevented by means of a plentiful supply of cold drinks during and between meals, at all hours of the day. The prevention of voluntary dehydration during effort may be achieved by supplying suitable drinks cooled to a temperature of 50° to 55° F. The type of beverage favored by men under a considerable effort in a hot environment is a cold, sweetened, fruit-flavored drink. Gaseous drinks, beer, and milk were not suitable for drinking in large amounts during effort. A further means of reducing voluntary dehydration during effort was to space the periods of rest so that instead of marching 50 minutes and resting 10 each hour, the men continued the march a little longer and were thus able to rest for longer periods and spend more time drinking. Prevention of voluntary dehydration is of importance in decreasing lassitute, loss of appetite, and unwillingness to work. It also improves the heat-dissipating mechanism thus preventing undue rise of rectal temperature during effort.

A65-80901
HEAT REACTIONS OF DIFFERENT ETHNIC GROUPS.
C. H. Wyndham (Transvaal Chamber of Mines, Appl. Physiol. Lab., Johannesburg, South Africa).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 143–156. 19 refs.

Reactions to a standard heat load of random samples of males in populations in various parts of the world in their natural state of acclimatizations are investigated. To provide a yardstick against which to judge the natural state of acclimatization of the various peoples studied, samples of young male Caucasians and Bantus were also studied under test conditions both in their natural state of acclimatization to living in the temperate climate of Johannesburg and also after both ethnic groups had been exposed to a similar, severe acclimatization procedure. This comprised two weeks of work for 4 hours per day at 1.0 liter per min oxygen consumption at 93°F air temperature, with the air saturated with water vapor and an air velocity of 150 ft per min. Samples of the following populations were also studied: (a) Caucasians and Aborigines in the hot, humid tropics at Weipa on the Cape York Peninsula of Australia; (b) Caucasians and Arabs at Hassi-Messaoud in the Sahara Desert and; (c) desert and "river" Bushmen in the Kalahari desert and Okovango swamps. Possibly the most impressive outcome of this study is that ethnic groups with very markedly different anthropometric characteristics such as Australian Caucasians and Aborigines in the hot, humid tropics, or Arabs and Caucasians in the desert, show very similar heart rates and rectal temperatures. The fact that men who have lived for generations in hot conditions do not have lower rectal temperatures and heart rates would seem to suggest that these are not genetic factors in acclimatization to heat.

A65-80902
PERFORMANCE AND COMFORT STANDARDS IN RELATION TO CLIMATE.
C. H. Wyndham (Transvaal Chamber of Mines, Appl. Physiol. Lab., Johannesburg, South Africa).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 189–198. 20 refs.

The author discusses the problems of performance and comfort standards in relation to climate by (1) evaluating equations for expressing heat transfer in a single quantitative formula of human reactions to heat; (2) examining temperature sensations in relation to the effective temperature conditions of the air for establishing comfort of a population; and (3) reviewing the effects of heat on human performance. Taking into account various physical laws of heat transfer, the author produces a dimensionless equation based on constants and experimental observations, and proposes that it be used as a basis for studying heat transfer in man. A discussion is given of various studies done in hot-rooms to measure heat effects on performance. These studies are criticized for their lack of environmental correctness, and for ignoring other psychophysiological variables. It is stressed that experimental situations should take into account the normal working environment. One of these studies incorporating the entire environment (gold mine) is compared to Mackworth's classical study of heat effects on performance done in a hot-room. The gold-mine studies show the relationships of wind velocity and wet-bulb temperatures, and validate some of the conclusions of Mackworth. Some difference of opinion remains between the two studies concerning the effects of acclimatization on work performance.

A65-80903
THE INFLUENCE OF WORK AND ENVIRONMENTAL CONDITIONS ON THE PHYSIOLOGICAL RESPONSES AND THERMAL EQUILIBRIUM OF MAN.
B. Givoni (Technion-Israel Inst. of Technol., Building Res. Station, Haifa, Israel).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 199–204. 5 refs.

A method for evaluating work and environmental effects on man's physiology and thermal equilibrium is presented. This is a biophysical analysis of heat exchange between man and environment and of the influence of climatic factors. A new thermal index is derived, incorporating the cooling efficiency of heat loss by sweat evaporation. In order to increase cooling efficiency, a required sweat rate under various work conditions is needed. A formula for calculating the sweat rate for specific conditions of work, climate, and clothing is given. In order to test the formula, investigations carried out in different countries under various conditions were compared to the theoretical values, and reliable estimates for weight loss could be predicted from the new index. Further industrial and occupational applications of the index are suggested.

A65-80904
THE ROLE OF BLOOD-TYPING IN THE STUDY OF ARID ZONE POPULATIONS [LE ROLE DE L'HEMOTYPOLOGIE DANS L'ETUDE DES POPULATIONS DES ZONES ARIDES].
J. Ruffié (Centre d'Etudes des Problemes Humains dans les Zones Arides, Paris, France).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 181–185. 13 refs. In French.

Blood-typing facilitates the determination of certain genetic characteristics such as erythrocyte and serum groups and hemoglobin types, some of which follow a fairly strict racial distribution pattern (e.g., Gm-like serum group and S, C, or D-hemoglobin). Such data assist in establishing the detailed composition of human groups studied, in comparing them with neighboring groups, and ascertaining from this the direction of migratory movements. Hematological studies investigating the distribution of populations in the Sahara Desert are described. The effects of this environment on hematological characteristics are also described.

A65-80905
MAN'S THERMAL BALANCE AND THE ENVIRONMENTAL INDICES.
A. H. Woodcock (U.S. Army Res. Inst., Natick, Mass.)
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 205–211.

An analysis and evaluation is presented of some of the environmental indexes used to assess hot or warm environments and their effect on man. Heat stress must be defined to make an assessment, and the author discusses and derives a general equation for heat loss applied to the skin. Two further components are derived: (1) evaporative cooling and (2) the wet-skin condition. These components are related to skin temperature and wind velocity. Thermal equilibrium is further discussed in relation to relative skin humidities. Of the various indexes the author discusses in detail the globe-temperature index. A description of the globe thermometer is given. It is pointed out that the globe thermometer combines the mean radiant temperature and the air temperature in the same proportions as they affect man. This makes it successful as an index of heat exchange for man. A system is proposed using three globes. This is complicated but includes all the variables such as air temperature, long-wave radiation, sunlight, and wind velocity.

A65-80906
PHYSICAL WORK CAPACITY OF MAN AND ITS DIMINUTION BY HEAT STRESS.
E. A. Muller (Max-Planck-Inst. for Arbeitsphysiol., Dortmund, Germany).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 221–225.

Physical work capacity of man is discussed with regard to concepts of maximum work time, endurance limit, fatigue and recovery, maximal oxygen intake, and occupational work capacity. Up to 30 years of age there is a perfect 1:5 relationship between occupational work capacity and maximal work capacity. Both age and physical inactivity will lead to dissociation between occupational and maximal work capacity. Determination of the recovery pulse sum (i.e., the sum of all the pulse rates above rest frequency) is a direct way of measuring pulse debt incurred in a given amount of work. Experiments investigating the effect of different water temperatures on work endurance (maximum work time) showed that endurance increases as the water temperature decreases. Pulse rate and recovery pulse sum also increase under heat stress. The course of pulse rate may be used to assess heat stress taking into account the special pattern of work, endurance limit, and recovery from fatigue.

A65-80907
PHYSICAL EXERCISE, HEART RATES, AND CORE TEMPERATURE [EXERCICES PHYSIQUES, FREQUENCES CARDIAQUES ET TEMPERATURE CENTRALE].
G. E. Lambert (Center of Study and Inform. of Human Problems in Arid Zones, Paris, France).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 227–230. 5 refs.

In the course of 10-month study carried out in a desert area, observations were made of the variations in heart rate and core temperature of 4 young men performing standardized physical and psychological tests by day and at night alternately. From the cardiovascular angle, heat tolerance is aided by light physical exercise, and continuous exposure to heat appears to assist cardiac reactions to effort. As regards thermal regulation, chronic exposure to heat produces a marked drop in the temperature of the central organs during rest and the disappearance of day/night temperature variation in the course of night work during very hot periods. These changes cease to occur when the subject ceases to be exposed to heat. The author discusses the parts played by various factors in the adaptation of the organism, with emphasis on the beneficial effect of moderate physical exercise.

A65-80908
HEAT EXCHANGES IN SUBJECTS LIVING IN ARID ZONES [LES ECHANGES CALORIQUES CHEZ LES SUJETS VIVANT DANS LES ZONES ARIDES].
R. R. Lemaire (Caen U., School of Med. and Pharm., France).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 309–313. 16 refs.

In individuals adapted to hot, dry climates, heat dissipation takes place very rapidly by convection and radiation. The rate of evaporation, and hence of heat exchange, is increased by the constant air movement of the desert. A distinctly higher skin temperature is observable for body parts exposed to solar radiation, especially for dark-pigmented skin, but skin temperature is lower in covered body parts in adapted individuals than in nonadapted individuals. The average skin temperature is lower in adapted than in nonadapted individuals. Although cutaneous water diffusion remains the most efficacious means of heat loss in hot, arid climates, there is a definite increase in pulmonary water diffusion in adapted individuals. Thermal homeostasis is approximately maintained by means of heat loss through water evaporation. The reactions are regulated by the nervous system which induces partial cutaneous vasodilation, and by a higher rate of secretion of the two hormones, aldosterone and the antidiuretic hormone.

A65-80909
RADIATION LOAD BY DIRECT SUN RADIATION AND SCATTERED SKY RADIATION ON INSTRUMENTS IMITATING THE PHYSIOLOGICAL BEHAVIOUR OF HUMAN BODIES.
N. Robinson (Technion-Israel Inst. of Technol., Dept. of Phys., Haifa, Israel).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.

(Arid Zone Research, XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 315–323. 8 refs.

Sensations of the human body as a function of thermal equilibrium existing between his body and the environment are investigated. A unit (1 mcal per cm^2 per sec) is introduced to express the heating and cooling powers numerically. This unit determines how many millicalories are gained or lost by 1 cm^2 of a human body in 1 sec. The cooling power comfort zone is 10 to 25 cooling power units. Elements of thermal equilibrium are analyzed, instruments for measuring this equilibrium and all its elements are described, and the manner in which the latter reproduce human behavior is explained. Calculations are presented in tabular form of the heat load issuing directly from solar radiation and from radiation diffused by the sky on instruments of different forms and orientations, similar to the heat load of the human body.

A65-80910
PARTITION OF CONVECTIVE AND RADIANT HEAT LOADS IN THE SAHARA [CHARGE DE CHALEUR PAR CONVECTION ET RAYONNEMENT EN MILIEU DESERTIQUE].
B. Metz, G. Lambert, R. van Hove, and J. P. Simon (Centre d'etudes de physiol. appl. au travail, Strasbourg, France).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research, XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 331–334.

Heat storage capacity during a 1-hour hike in the Sahara desert was obtained from 4 men during 15 days in August, 1959. Heat storage capacity obtained from body weights and rectal temperature combined with an estimation of the energy expenditure were compared with the convection and radiation heat loads computed from dry-bulb temperature, black-globe temperature, and air speed. A statistical analysis of the 60 groups of values obtained by this procedure shows that despite changing air temperature and speed the radiation load can be considered a constant amounting to slightly more than 200 kcal/m^2 hr, and convection head load amounts to 90% of the value calculated by applying the Fort Knox equations.

A65-80911
THE NEUROPHYSIOLOGY OF HEAT EXPOSURE: INTRODUCTORY REMARKS.
J. Magnes (Hebrew U., Hadassah Med. School, Dept. of Physiol., Jerusalem, Israel).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research, XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 339–341. 16 refs.

Basic problems of the effects of heat on the nervous system are highlighted at the levels of the thermoreceptors, the receptor potentials, the sensory axons, and the brain electrical activity. Moderate warming causes electroencephalographic synchronization and inhibition of gamma motor activity, whereas intense warming results in arousal and activation of the gamma motor system. These findings suggest that the reticular formation plays a role in the thermoregulatory processes. Injurious effects of heat are of two types, reversible and irreversible, with the so-called "heat paralysis" of the nerve assuming an intermediate stage.

A65-80912
ON THE BODY THERMOSTAT AND ITS SETTING.
C. von Euler (Karolinska Inst., Nobel Inst. for Neurophysiol., Stockholm, Sweden).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research, XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 343–349. 64 refs.

The temperature of the anterior hypothalamus of rabbits was raised by means of a high-frequency alternating current through chronically implanted electrodes. In response the respiratory rate increased, the ear temperature rose as an index of vasodilatation, behavioral changes were those of an overheated animal, and the body temperature fell until a new steady state was established. At that point the respiratory rate and vasodilatation decreased, approaching control values. The recorded fall in body temperature was from 8 to 10 times greater than the elevation of temperature of the hypothalamus. Increased hypothalamic temperatures elicited desynchronization of the activity of the neocortex and of the hippocampus characteristic of drowsiness and sleep. Concomitantly there was a progressive inhibition of gamma motor and muscle spindle activity. The converse accompanied lowered body or hypothalamic temperature. This indicates that hypothalamic thermoreceptors project to the activating brainstem reticular system which plays an important role in other homeostatic mechanisms. Variations in body temperature at various levels of activity may be considered as an adjustment of the set point rather than failure of the temperature regulating mechanism. The set point is adjusted in muscular exercise, diurnally, and in fever. Subsequent experiments elucidated the interplay among thermoregulating reactions, body temperature, gamma motor system, catecholamines, and baroreceptor reflexes.

A65-80913
HABITUATION TO HEAT AND COLD AT THE SPINAL CORD LEVEL.
W. V. Macfarlane (Australian Natl. U., Canberra).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research, XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 351–355. 16 refs.

Cats whose spinal cords had been cut at the thoracic level during their first two weeks of life, were habituated by means of daily applications of cold to the point of complete inhibition of motor reflexes of the exposed leg. After 50 days of habituation the inhibition spread to the other leg. Subsequent exposure to heat reactivated cold reflexes. Repeated exposures of the limbs to 49° C produced a similar pattern of habituation. Alternating exposures of the same leg to cold in the morning and to heat at night daily for 30 days reduced reflexes to both by 80%. It is concluded that motor responses to thermal stimulation can be modified by prolonged exposure as a result of changes in the central interneuronal activity at the spinal level. A pattern of inhibition is retained for many months and, if extinguished by lack of stimuli, is rapidly relearned upon reexposure. Exposure of one set of receptors to thermal stimulation may result in linkage with the central endings of receptors in other regions or on the other side of the body.

A65-80914
ABNORMAL AUDITORY ADAPTATION WITH USE OF AMPLITUDE MODULATED TONES.
Tokuro Suzuki, Nobuo Yoshie, Nagamasa Sakabe, and Eikichi Igarashi (Shinshu U., Dept. of Otolaryngol., Matsumoto, Japan).
Journal of Auditory Research, vol. 4, Oct. 1964, p. 213–226. 9 refs.

This study looked for the clinical significance of four phenomena: threshold tone decay (TTD), threshold tracing shifts in Békésy fixed-frequency audiometry (TTS), wide separation between continuous and interrupted test signal tracings in Békésy fixed-frequency audiometry, and reduced peak-to-peak amplitude of the Békésy tracings. An amplitude-modulated tone was introduced as a test signal in both the Békésy audiometry and the self-recording TTD test, and comparisons between the continuous and interrupted tracings were made. The degree of auditory adaptation at threshold levels can be seen to vary with the extent in dB of amplitude modulation. Continuous tones reveal all four phenomena to their most marked degree. The amplitude-modulated tracings showed transitions between the most marked abnormal adaptation to the continuous tones and the normal (nonadaptation) findings to the interrupted tones, according to the extent in dB of the modulation. Reduced peak-to-peak tracing amplitudes might be explained in terms of initial or "fast" auditory adaptation, while TTD, TTS and wide separation can perhaps be explained in terms of perstimulatory or "slow" auditory adaptation.

A65-80915
SIMULATED ASCENT IN A DECOMPRESSION CHAMBER: ITS ROLE IN OTO-RHINO-LARYNGOLOGIC EVALUATION OF FLIGHT PERSONNEL [LA MONTEE FICTIVE AU CAISSON A DEPRESSION SA PLACE EN MATIERE D'EXPERTISE O.R.L. CHEZ LE P.N.].
R. Bertoni and P. Bouville (C.E.M.P.N., Nancy, France).
Revue de Médecine Aéronautique, vol. 3, Oct.–Nov. 1964, p. 9–10. In French.

Simulated ascent in the decompression chamber is the only dynamic function test for evaluating middle ear function and ostial permeability of the nasosinus cavity. It is the last obligatory test to which pilot candidates who have satisfied all other clinical and paraclinical tests are subjected. The test consists of ascent to 5000 meters at 20 meters/second in two stages of 5 minutes, respectively, at 3000 m and at 5 m with descent to 5 m at 3 meters/second. Out of 1000 tested subjects, 36 revealed typical barotraumatic otitis with earache, 42 earache, reddened tympanum and hyperemia, and 6 barotraumatic sinusitis. It is not necessary to acend to high altitudes in order to demonstrate tubal discomfort. For certain persons, especially flyers, having undergone treatment for recent barotraumatism and wishing to return to flight duty, a low altitude test is given with ascent to 500 m at 20 meters/second and descent at 10 meters/second. The trained eye can easily identify tubal dysfunction. A second ascent to 1000 m made under the same conditions may be used to verify doubtful cases.

A65-80916
AUTONOMOUS REACTIONS OBSERVED IN CATS DURING ROCKET FLIGHT [LES REACTIONS VEGETATIVES OBSERVEES CHEZ LE CHAT AU COURS D'UN VOL EN FUSEE].
R. Grandpierre, P. Buser, G. Chatelier, J. Ginet, and M. Nicolas.
Revue de Médecine Aéronautique, vol. 3, Oct.–Nov. 1964, p. 21–22. In French.

On October 18, 1963, a Veronique rocket was launched with a cat aboard having fixed electrodes implanted into the cranium in order to study central nervous system activity. The electrocardiogram and respiratory frequency

were also studied. It was demonstrated that the propulsion phase (50 seconds) was well tolerated and the period of weightlessness (5 minutes) revealed no vegetative disorders. On the contrary, major disorders (extrasystolic ventricular bigeminism and polypnea) developed during reentry of the rocket into the atmosphere. Excitation of the carotid baroreceptors and of the vestibular system, along with emotional reactions, appeared to be the cause of these disorders. When the animal was removed from the container the disorders disappeared.

A65-80917
CONTRIBUTION TO THE STUDY OF ARTIFICIAL ATMOSPHERES: VENTILATORY REACTIONS IN THE AWAKE DOG SUBJECTED TO MODERATE HYPERCAPNIA IN A NORMOXIC OR SLIGHTLY HYPOXIC ATMOSPHERE [CONTRIBUTION A L'ETUDE DES ATMOSPHERES ARTIFICIELLES: REACTIONS VENTILATOIRES CHEZ LE CHIEN EVEILLE SOUMIS A UNE HYPERCAPNIE MODEREE EN ATMOSPHERE NORMOXIQUE OU LEGEREMENT HYPOXIQUE].
R. Puccinelli, P. Mallet, J. Fabre, and P. Bouverot.
Revue de Medecine Aeronautique, vol. 3, Oct.–Nov. 1964, p. 23–25. 8 refs. In French.

The ventilatory reaction to moderate hypercapnia (1.5% carbon dioxide and 20.9% oxygen) were studied at low altitude in the awake normoxic dog, and in the dog previously rendered slightly hypoxic (hypercapnic hypoxia). It was verified that carbon dioxide alveolar partial pressure could be maintained at its normal value in hypoxic hypercapnia. Other authors have observed that hyperoxia led to loss of arterial chemosensitivity during carbon dioxide exposure. To select an artificial atmosphere for a closed cabin, it is recommended that the oxygen partial pressure be equal or slightly lower than 150 mm Hg where the dilutant is nitrogen, in order to tolerate a residual level of pure carbon dioxide.

A65-80918
STATISTICAL STUDY OF EJECTIONS OBSERVED IN THE FRENCH ARMY (1951 THROUGH 1963) [ETUDE DE LA STATISTIQUE DES EJECTIONS OBSERVEES DANS L'ARMEE FRANCAISE (1951 A 1963 INCLUS)].
R. P. Delahaye, J. Fabre, H. Mangin, and P. Galban (H.M.I. Dominique Larrey, Versaille, S.-et-O.; C.E.R.M.A.; and C.P.E.M.P.N., Paris, France).
Revue de Medecine Aeronautique, vol. 3, Oct.–Nov. 1964, p. 27–373. In French.

A discussion is presented of the development of the ejection seat in Germany during World War II, the principle of the ejection seat, and the types of seats (distinguished according to ejection after acceleration, or after the command system of ejection). Described are the different phases of an ejection (preparation, ejection, abandoning the seat, parachuting, landing) along with representative figures of ejection sequences with Republic and Martin-Baker seats. The types of ejections described were principally used by the French Air Force. From October 1951 to 1963, 204 ejections were made. These are tabulated as to type of aircraft and seat used. The results were variable. Many injuries, fracture of the spine, arms, and legs, were observed. Ejections are further tabulated as to whether deficient or successful, the overall result, according to year, type of seat, as a function of altitude, speed, and the traumatology incurred.

A65-80919
ADVANTAGES OF EXPLORATORY RADIOLOGICAL EXAMINATION IN JET PILOTS [INTERET D'UN EXAMEN RADIOLOGIQUE DE DEPISTAGE CHEZ LES PILOTES D'AVIONS A REACTION].
R. P. Delahaye, H. Mangin, H. Seris, and R. Auffret (Hôp. Mil. Dominique Larrey, Versailles; and C.E.V., Lab. de Med. Aerospatiale, Bretigny-sur-Orge, S.-et-O., France).
Revue de Medecine Aeronautique, vol. 3, Oct.–Nov. 1964, p. 49–52. In French.

Radiological examination of the dorsal and lumbar spine in jet pilots having to use ejection seats must be systematic during admission and periodic medical examinations. This systematic examination is of major value from the diagnostic and medicolegal standpoint. Radiological examination may uncover evolutive bone lesions (Pott's disease, angiomas) or severe congenital spinal disorder which lead to disqualification of a pilot candidate or pilot. Examination can reveal vertebral static disorders, vertebral slipping, and changes in the discoligamentary system. The disorders may be discovered radiologically in a homogeneous population not presenting any clinical signs of spinal disorders. Observations are made of pilots with congenital spinal malformation, who ejected without sustaining any spinal damage. Discussion is presented on the technique for systematic radiographic examination of the spine, noting the problem associated with gonadal dosage. It is established that acquired affections (inflammatory, tumoral) or severe congenital diseases necessitate the elimination of pilots from flight duty, as do anterior coin lesions, retromarginal hernia, and epiphysoses. However, abnormalities of the lumbosacral hinge transitions which are not painful conditions, are considered compatible with normal flight duty.

A65-80920
BODY MOVEMENTS IN STATE OF WEIGHTLESSNESS [DVIGATEL'NYE REAKTSII V USLOVIIAKH NEVESOMOSTI].
I. I. Kas'ian, V. I. Kopanev, and E. M. Iuganov.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 5, Sep.–Oct. 1964, p. 677–689. 46 refs. In Russian.

The results of experiments on humans and experimental animals, and data obtained during the manned space flights indicated that the effect of weightlessness on body movements is slight. This disturbance is evidently due to functional disturbances of the analyzers. However, this mechanism is not yet fully understood, and requires further study.

A65-80921
EFFECT OF PROLONGED WEIGHTLESSNESS ON THE CONTINUOUS FUNCTION OF THE CARDIAC MUSCLE [O VLIIANII DLITEL'NOI NEVESOMOSTI NA FUNKTSIIU AVTOMATIZMA DERDECHNOI MYSHTSY].
R. M. Baevskii and K. I. Zhukov.
Kosmicheskiie Issledovaniia, vol. 2, Nov.–Dec. 1964, p. 936–938. In Russian.

Statistical analysis of data obtained during flights of the Soviet spaceships Vostok 5 and Vostok 6, on the duration of the heart action cycle revealed information on the effect of weightlessness on cardiac function. During weightlessness the functional state of the pacemaker indicated a predominance of parasympathetic over sympathetic influences. This factor may be one of the complex mechanisms of adaptation of the blood circulation in weightlessness. The irregularity of the blood circulation cycle during space flight may therefore be considered a normal physiological response to the functional disturbances of the entire organism, and depends upon the relationship between the sympathetic and the parasympathetic systems.

A65-80922
COMBINED EFFECT OF LOW-FREQUENCY VIBRATION AND X-RAYS ON CELLS OF BONE MARROW IN MAMMALS [KOMBINIROVANNOE DEISTVIE NIZKOCHASTOTNOI VIBRATSII I RENTGENOVSKIKH LUCHEI NA KLETKI KOSTNOGO MOZGA MLEKOPITAIUSHCHIKH].
Iu. S. Demin.
Kosmicheskie Issledovaniia, vol. 2, Nov.–Dec. 1964, p. 939–945. 24 refs. In Russian.

Mice were exposed to vertical vibrations of 70 cps or a 50 r dose of X-rays, separately or in combination. Vibration alone produced disturbances in mitoses of bone marrow cells, due to chromosomal adhesions. Exposure to vibration, preliminary to radiation, did not increase the number of cells affected by the radiation alone, but changed the character of the disturbances. It decreased the number of chromosome rearrangements, but increased the number of adhesions.

A65-80923
TRAINING FOR WEIGHTLESSNESS [POPGOTOVKA CHELOVEKA K NEVESOMOSTI].
A. Eremin, I. Kolosov, V. Kopanev, V. Lebedev, N. Popov, and G. Khlebnikov.
Aviatsiia i Kosmonavtika, no. 1, Jan. 1965, p. 64–70. In Russian.

In the biomedical training of cosmonauts the effect of weightlessness on the physical, physiological, and mental states of man is of utmost importance. The most effective method to accustom the future spaceman to space-flight conditions is in flight along a parabolic curve. Experiments showed that one important factor which affects the physiology during weightlessness is the anxiety produced by the strange sensation of disorientation in space. This anxiety disappears after intensive training.

A65-80924
AGOSTINO GEMELLI, PIONEER OF AEROSPACE MEDICAL STUDIES IN ITALY [AGOSTINO GEMELLI, PIONIERE DEGLI STUDI DI MEDICINA AERONAUTICA IN ITALIA].
T. Lomonaco (Ispettorato di Sanita Aeronautica, Rome, Italy).
(Commemoration Meeting for Father Agostino Gemelli, Rome, Dec. 9, 1964).
Rivista di Medicina Aeronautica e Spaziale, vol. 27 (Supplement to no. 4), 1964, p. 12–21. In Italian.

Agostino Gemelli, along with Amedeo Herlitzka, is the father of Aviation Medicine in Italy. Gemelli, a medical officer during the war of 1915 to 1918 established the first laboratories to study aviation psychophysiology. These were later divided into the Medico-Legal Institutes of Aviation and the Center for Scientific Psychophysiological Research in Aviation. Another center created for the selection and medical control of flying personnel formulated the first rules for psychophysiological selection of pilots. He was greatly involved in scientific research, publishing articles on blood composition, psychophysiological factors, cardiac and respiratory frequency of aviators, etc. In 1921 he became director of l'Universita Cattolica de S. Cuore, Milan, and pursued further physiological studies on aviators (pilot orientation in space, vestibular apparatus of pilots). He attended the 1916 and 1937 conferences on aviation medicine and received international acclaim for his studies. The Center for Studies and Research in Aviation and Space Medicine, Rome, is a direct descendent of Gemelli's original centers. In 1942,

Gemelli published his treatise on various phases of aviation medicine. He died on July 15, 1959, at the age of 81.

A65-80925
CONTRIBUTION OF AGOSTINO GEMELLI TO THE PROGRESS OF GENERAL AND AVIATION PSYCHOLOGY [CONTRIBUTO DI AGOSTINO GEMELLI AL PROGRESSO DELLA PSICOLOGIA GENERALE E DI QUELLA AERONAUTICA].
Leonardo Ancona.
(Commemoration Meeting for Father Agostino Gemelli, Rome, Dec. 9, 1964). Rivista di Medicina Aeronautica e Spaziale, vol. 27, (Supplement to no. 4), 1964, p. 22–29. In Italian.

Agostino Gemelli's psychological contributions to aviation medicine are considered in three aspects. The first deals with pilot selection. Using experimental psychological techniques, he examined reaction times before, during, and after flight; measured emotions during takeoff, flight, and landing; and established profiles for fit and unfit pilots. The second is concerned with the clinical appraisal of a subject's dynamic personality. Orientation of the body in space, another of Gemelli's contributions, was attributed to static sense organs located in the labyrinth. Using psychophysiological techniques he was able to show a fundamental dynamic and psychological distinction between individuals who perceived a field dependently or independently (field dependent or field independent). He also demonstrated that the capacity for orientation in space was related to mental function, based on memory, attention, and intelligence.

A65-80926
AVIATION MEDICINE AND RESEARCH IN THE FIELD OF OTO-RHINO-LARYNGOLOGY IN THE WORK OF FATHER AGOSTINO GEMELLI [MEDICINA AERONAUTICA E RICERCHE IN CAMPO OTO-RINO-LARINGOIATRICO NELL'OPERA DI PADRE AGOSTINO GEMELLI].
Vincenzo Fortunato.
(Commemoration Meeting for Father Agostino Gemelli, Rome, Dec. 9, 1964). Rivista di Medicina Aeronautica e Spaziale, vol. 27 (Supplement to no. 4), 1964, p. 30–39. In Italian.

A review of Agostino Gemelli's works reveals that he pioneered studies on voice, language, and audiophysiology. Of special interest to aviation are his studies dealing with the localization of sounds in space. He was the first to graphically register the otokinetic reflex by means of an electroencephalograph. He evaluated the effects of atmospheric decompression and anoxia on man during flight using the respiratory curve, electrocardiogram, sphygmogram and arterial tonography. In his preoccupation to make flying safe he considered pilot selection techniques important. He formulated biological tests for the sense organs, hearing, equilibrium, vision, and the respiratory and cardiovascular systems, and studied perception processes (psychophysical coordination and emotional reactions).

A65-80927
EFFECT OF γ-RAYS AND VIBRATION ON THE PHYSICAL AND CHEMICAL PROPERTIES OF RED BLOOD CELLS [VLIIANIE GAMMA-LUCHEI I VIBRATSII NA FIZIKO-KHIMICHESKIE SVOISTVA KRASNYKH KROVIANYKH TELETS].
Iu. A. Kriger and E. A. Sverdlova.
Doklady Akademii Nauk SSSR, vol. 160, Jan. 21, 1965, p. 713–716. 13 refs. In Russian.

The effect of γ-rays and vibration (70 cps) was studied on samples of whole human blood and on a suspension of washed erythrocytes in normal saline. The radiation doses were 4, 6, 30, and 80 kr. Blood was examined 24 hrs after the exposure. No changes were noted in the dielectric state of cells or the volume index after exposure. However, cells suspended in saline showed a greater tendency for potassium ion escape when they were resuspended in isotonic sucrose solution. This effect on the permeability of the cell membrane can be explained by the absence of plasma which acts as a radioprotective agent.

A65-80928
THE DEGREE OF THE PHOSPHATE GROUP TURNOVER IN VARIOUS PHOSPHOLIPID FRACTIONS OF BRAIN IN RATS AT DIFFERENT STAGES OF HYPOXIA [INTENSIVNOST' OBMENA FOSFATNYKH GRUPP OTDEL'NYKH FRAKTSII FOSFOLIPIDOV MOZGA KRYS PRI RAZLICHNYKH STEPENIAKH GIPOKSII].
V. Ia. Dvorkin.
Doklady Akademii Nauk SSSR, vol. 160, Jan. 21, 1965, p. 728–730. In Russian.

The degree of phosphate turnover in various phospholipid fractions of brain tissues at different stages of hypoxia was studied in rats subjected to simulated altitude in pressure chambers. Incorporation of the phosphate group from $Na_2HP^{32}O_4$, injected subcutaneously, was taken as an indicator of this process. The results showed that hypoxia affects the metabolism of various phospholipid fractions at different degrees. The turnover of fractions 1, 2, and 5 reached a low at 240 mm pressure, and the subsequent reduction of atmospheric pressure showed no further effect. In fractions 3 and 4 the effect was progressive with the decrease in pressure. Any explanation for this biochemical effect of hypoxia is still lacking. Further insight into the chemical structural differences of fractions may be gained by biosynthesis, and by the determination of the individual phospholipid group disposition in the nervous tissues.

A65-80929
THE EFFECT OF VESTIBULAR STIMULATION ON THE HIGHER NERVOUS SYSTEM IN RATS [VLIIANIE VESTIBULIARNOGO RAZDRAZHENIIA NA VYSSHUIU NERVNUIU DEIATEL'NOST KRYS].
K. Fedorov, G. A. Obraztsova, and S. I. Nudman.
Doklady Akademii Nauk SSSR, vol. 160, Jan. 21, 1965, p. 734–736. In Russian.

The effect of vestibular apparatus stimulation on the central nervous system was studied in rats, on whom a motor-defensive conditioned reflex had been previously induced by photic and acoustic stimuli. The animals were subjected to acceleration stress in a centrifuge at clockwise rotation (60 rpm). The results show that vestibular stimulation distorted the conditioned reflex formed by an acoustic stimulus to a greater degree than the one formed by a visual stimulus. These findings must be taken into consideration in training subjects to conditioned reflexes in order to obtain maximum tolerance to acceleration stress.

A65-80930
UNUSUAL EXPERIMENT BY SOVIET SCIENTISTS [UNIKAL'NYI EKSPERIMENT SOVETSKIKH UCHENYKH].
A. V. Lebedinskii, S. V. Levinskii, and Iu. G. Nefedov.
Aviatsiia i Kosmonavtika, no. 11, Nov. 1964, p. 24–31. In Russian.

Prior to the cosmic flights, Soviet scientists set up experiments to study all possible factors that must be considered for human survival in a closed system such as a space capsule. Human subjects were placed in an environmental chamber, which was completely isolated from the outside world. The physiological and psychological reactions of the men were recorded and later subjected to analytical study. The major difference between life under normal conditions and living in a closed system is a reversal of effects: whereas in normal life the organism is influenced by the environment, in a closed system the organism's activity affects the environment. Thus, the products of respiration contaminate the ambient air, and the internal and external microflora contribute to the contamination; air temperature rises due to radiated heat from the organisms; and lack of ventilation and ultraviolet radiation result in accumulation of contaminants. The physiological state of an organism is, therefore, affected. Unusual noise from the equipment, lack of normal movements, and monotony affect normal sleep. All this leads to a disturbance of the physiological systems, particularly the nervous system, which in turn affects the mental state of the subject. Other factors were added to the normal environmental changes, such as low-intensity ionizing radiation, excessive noise and deliberate increase in temperature. All these factors are hazards anticipated in space flights.

A65-80931
A THEORY OF WEIGHTLESSNESS IS SOUGHT [NYZHNA TEORIIA NEVESOMOSTI].
P. K. Isakov, E. M. Iuganov, and I. I. Kas'ian.
Aviatsiia i Kosmonavtika, no. 11, Nov. 1964, p. 31–33. In Russian.

A uniform theory of the effects of acceleration and weightlessness on the living organism is desirable. So far, only separate facts are known. The gravitational pull, or absence of it, affect the physical as well as the functional state of the human organism. The kinesthetic sense in particular is affected. During acceleration stress the differential weight perception threshold is changed, which leads to inaccuracy in voluntary body movements. One example is difficulty in precision aiming at a target, enhanced by the exclusion of vision. Under acceleration stress, the coordination of skin and motor unit analyzers is lost. The effects of acceleration and weightlessness on bioelectrical activity was found to be opposite: acceleration increases the potential amplitude, while during weightlessness the potential amplitude is lower than normal and may reach the baseline. Acceleration evokes nystagmus, while weightlessness reduces nystagmus and changes the threshold of the otolith response to a stimulus. Gas exchange and energy-transfer data showed that before adaptation of the organism to weightlessness, values were above normal. It is possible that prolonged weightlessness may cause a reduction below normal.

A65-80932
CONDITIONS DURING PROLONGED SPACE FLIGHT [V USLOVIIAKH DLITEL'NOGO KOSMICHESKOGO POLETA].
I. T. Akulinichev and R. M. Baevskii.
Aviatsiia i Kosmonavtika, no. 11, Nov. 1964, p. 33–36. In Russian.

Interplanetary missions will be more complicated than orbital flights already accomplished by man. Difficulties in planning medical support over a long period of time are manifold: providing the astronauts with an atmosphere to which he is accustomed, ample supply of drinking water, suitable food, and means of protection against cold, heat, intense light, and harmful radiations. In light of present-day knowledge, ground medical control of the crew could be accomplished primarily by radio communication feeding the information from on-board computors and various devices constituting the telemetric

system to ground devices supervised by the ground medical staff. All these operations will require detailed and concise programing.

A65-80933
ISOLATION OF A DNA-RNA COMPLEX FORELLA CELLS.
Gerhard Richter and Horst Senger (Tubingen U., Botan. Inst. and Inst. for Chem. Plant Physiol., West Germany).
Biochimica et Biophysica Acta, vol. 95, Feb. 8, 1965, p. 362–364. 5 refs. Deutsche Forschungsgemeinschaft supported research.

Cells of synchronous autotrophic cultures of Chlorella pyrenoidosa, washed in a phosphorous-free culture medium and resuspended in it, were illuminated with 10^4 lux for 10 min at 30° C, with an addition of P^{32} (4 to 8μ/ml) to the medium for 5 to 15 sec, following illumination. The washed harvest was chromatographically extracted. Fractions from an 8 hr culture showed no coincidence in radioactive and ultraviolet absorbed DNA or high molecule RNA. The labelled DNA showed a high peak at the beginning of the curve and a lower one at the end. The ultraviolet absorption curve showed a peak, which followed closely the second peak. This was true for different phases of the 28-hr life cycle. When radioactive phosphorus was added for 5 to 9 sec, the radioactive peak eluted by a higher NaCl concentration, appeared significantly reduced, while the second peak contained most of the P^{32} incorporated into nucleic acids. The highly-labelled DNA fraction was not sensitive to deoxyribonuclease or ribonuclease. Alkaline hydolysis produced P^{32}labelled adenylic, guanylic, cytidylic, and uridylic nucleotides. These findings indicate a DNA and RNA complex, which contained newly-synthesized RNA, with a base ratio different from Chlorella DNA, and independent of the P^{32} exposure time. Analogous results were obtained from the nonsynchronous culture of Chlorella and Scenedesmus quadrisauda.

A65-80934
EFFECT OF RESERPINE ON RESPIRATORY EXCHANGE, ARTERIAL PRESSURE AND HEART RATE IN RAT ADAPTED TO LOW TEMPERATURE [EFFET DE LA RESERPINE SUR LES ECHANGES RESPIRATOIRES, LA PRESSION ARTERIELLE ET LE RYTHME CARDIAQUE DU RAT ADAPTE A BASSE TEMPERATURE].
L. Chevillard, R. Portet, M. Cadot, and M. Cabady (France, Coll., Ecole Prat. des Hautes Etudes, Lab. de Pharmacodynamie Biochim., Paris).
Archives internationales de Pharmacodynamie et de Therapie, vol. 153, Jan. 1965, p. 30–48. 55 refs. In French.

A comparison of the effects of reserpine in cold-acclimated rats (5° C) and in control rats maintained at 20° C revealed a particular sensitivity of the first group of animals to the drug. Measurement of respiratory metabolism, effected at 30° C on untreated animals, revealed differences between the two groups of rats, living in cold or at normal temperature. After reserpine treatment, oxygen consumption at 30° C of cold-adapted rats returned to the level usually observed at this temperature in controls living at 20° C. The calorigenic response between 10° and 30° C of adapted rats also was near that of the control group. Cold-acclimated reserpinized animals lost the advantages induced by cold acclimatization. The recorded values for arterial pressure and heart rate measurements were higher in adapted rats than in controls maintained at 20° C. In both groups, reserpine decreased these values to insignificantly different levels. It is assumed that these changes are induced by the depletion of catecholamines by reserpine. In cold-acclimated rats, these hormones seem to take an important part in various regulation mechanisms (circulatory, energetic). Cetain changes elicited by acclimatization seem to be due to amines. After reserpine, these changes disappear temporarily.

A65-80935
SPACE MEDICINE.
George E. Ruff (Pa. U., School of Med., Dept. of Psychiat., Philadelphia).
Medical Times, vol. 93, Apr. 1965, p. 353–360.

Contributions from almost all medical disciplines are required to prepare humans for space travel. Among the problems which must be solved, the following are prominent: the effects of gravitational pull, noise, vibration, extreme temperatures, and exterrestrial radiation; food and oxygen supply; removal of carbon dioxide and of digestive waste; the effects of toxic fuels; and the effects of altered day-night cycles and of physiological stress. Selection of the crew, training, and direct medical support must be included in the responsibilities of the medical personnel. Prelaunch, inflight, and postflight periods require especially close supervision to insure physical and emotional stability. The early missions have demonstrated that man has the capacity for space flight; but the limits of this capacity have not yet been fully explored.

A65-80936
THE EFFECT OF NICOTINE ON SWIMMING PERFORMANCE AND ATHEROMATOSIS OF RATS ON A HIGH CHOLESTEROL DIET [DIE WIRKUNG VON NIKOTIN AUF DIE SCHWIMMLEISTUNGEN UND ATHEROMATOSE CHOLESTERINBELASTETER RATTEN].
E. Grandjean and T. Abelin (Eidg. Tech. Hochschule, Inst. fur Hyg. und Arbeitsphysiol., Zurich, Switzerland; and Eidg. Turn- und Sportschule, Magglingen, Switzerland).
Schweizerische Zeitschrift fur Sportmedizin, vol. 12, 1964, p. 133–144. 9 refs. In German.

Four groups totaling 84 adult rats were subjected for 5 months to (1) a normal diet, (2) a normal diet plus a nicotine supplement of 0.0125%, (3) a cholesterol diet, and (4) a cholesterol diet plus a nicotine supplement of 0.0125%. The cholesterol diet produced a marked deterioration in swimming performance, a decrease of body weight, and an increase in the spontaneous mortality rate. Nicotine supplements did not exert a significant influence on swimming performance but decreased the body weight of rats on either diet and reduced the spontaneous mortality rate. Throughout the experiment the cholesterol diet provoked severe attacks of diarrhea. The cholesterol plus nicotine diets caused significantly less diarrhea, which may account for the lower mortality rate. In a majority of the animals, cholesterol diet caused atheromatous changes of the aorta. Nicotine increased the incidence of atheromatosis; in this respect, however, the differences between the animals who had received nicotine and animals who had not received it were not statistically significant.

A65-80937
DE- AND RE-GENERATION OF CHLOROPLASTS IN THE CELLS OF CHLORELLA PROTOTHECOIDES. I. SYNTHESIS OF NUCLEIC ACIDS AND PROTEIN IN RELATION TO THE PROCESS OF REGENERATION OF CHLOROPLASTS.
Shigeji Aoki and Eiji Hase (Toykyo U., Inst. of Appl. Microbiol.; and Tokugawa Inst. for Biol. Res., Japan).
Plant and Cell Physiology, vol. 5, Dec. 1964, p. 473–484. 16 refs. Min. of Educ. and Charles F. Kettering Found. supported research.

When Chlorella protothecoides was grown under illumination in a medium rich in glucose but poor in nitrogen source, the cells were devoid of chlorophyll and contained only small amounts of RNA and protein. When these glucose-bleached cells were further grown in a medium containing only a nitrogen source, RNA, protein, and chlorophyll were synthesized. If light was excluded, the glucose-bleached cells grown on the nitrogen source alone, the amount of RNA, protein, and chlorophyll were formed in reduced amounts equal to the amounts found in etiolated alga cells. The etiolated cells subjected to illumination and grown on a nitrogen source alone showed an increase in synthesis products. Therefore, greening of glucose-bleached cells involves a light-independent phase, followed by a light-requiring phase, which entails the greening of cells and full organization of chloroplasts. The latter process is essentially the same as that taking place when etiolated cells are incubated under illumination with a nitrogen source in the absence of glucose.

A65-80938
DE- AND RE-GENERATION OF CHLOROPLASTS IN THE CELLS OF CHLORELLA PROTOTHECOIDES. II. EFFECTS OF ACTINOMYCIN ON GREENING OF "GLUCOSE-BLEACHED" AND "ETIOLATED" ALGAL CELLS.
Shigeji Aoki and Eiji Hase (Tokyo U., Inst. of Appl. Microbiol.; and Tokugawa Inst. for Biol. Res., Japan).
Plant and Cell Physiology, vol. 5, Dec. 1964, p. 485–493. 15 refs. Min. of Educ. and Charles F. Kettering Found. supported research.

The "glucose-bleached" and "etiolated" cells of Chlorella protothecoides having plastids of different degrees of degeneration were prepared by the method previously reported, and the effects of actinomycin (C complex) upon the processes of greening of these cells were investigated under various experimental conditions. As has been shown previously, these cells formed normal chloroplasts on being incubated in the light with provision of nitrogen source (urea), but without glucose. The greening process of the glucose-bleached cells has been found to differ from that of the etiolated cells in the point that it involves a light-independent phase preceding a light-requiring phase. It was revealed that the greening of glucose-bleached cells is inhibited by actinomycin much more strongly than that of etiolated cells. On applying the antibiotic at different times during the chloroplast development in glucose-bleached cells, it was found that the inhibitory effect was remarkably reduced with the progress of the developmental process. This indicated that the antibiotic attacked more strongly the light-independent phase than the light-requiring phase in question. Based on these observations it was inferred that, in the process of chloroplast development in glucose-bleached cells, DNA and RNA are playing important roles, especially during the early light-independent phase of chloroplast development.

A65-80939
EFFECTS OF LIGHT INTENSITY AND SUCROSE ON THE FLOWERING OF LEMNA PERPUSILLA.
Yoji Esashi and Yoshiharu Oda (Tohoku U., Inst. for Agr. Res., Sendai, Japan).
Plant and Cell Physiology, vol. 5, Dec. 1964, p. 513–516. 7 refs. Min. of Educ. supported research.

The study of a 3-frond colony of Lemna perpusilla (which has been considered for gas exchange purposes in closed ecological systems) grown at 26°+2°C and illuminated by 1400 to 7000 lux showed that L iperpusilla is a short-day (SD) plant with mild photoperiodic requirements. With

addition of ethylene-diaminetetraacetic acid (EDTA) under continuous illumination, colony multiplication and vegetative growth were promoted but floral induction was inhibited. EDTA may inhibit the long-day (LD) plant flowering by acceleration of the LD reaction system. If EDTA acts upon the photoperiodic flowering through chelation with iron, iron seems to associate with the LD reactions system. In the LD flowering of Begonia evansiana grown from large seed tubers, on the other hand, high intensity light and sucrose may induce LD flowering by promoting the synthesis of a precursor A* common to LD and SD reaction systems. That is, light of high intensity and sucrose of high concentration will produce a great quantity of A* than may be consumed by LD reaction accelerated by EDTA, thus causing LD flowering in spite of promotion of vegetative growth of EDTA.

A65-80940
CHANGES IN MINERAL CONCENTRATION IN NUTRIENT MEDIUM DURING CHLORELLA GROWTH [IZMENENIE MINERAL'NOGO SOSTAVA PITATEL'NOI SREDY PRI KUL'TIVIROVANII KHLORELLY].
E. D. Kuznetsov and M. G. Vladimirova (USSR, Acad. of Sci., K. A. Timiriazeva Inst. of Plant Physiol., Moscow).
Fiziologiia Rastenii, vol. 12, Jan.-Feb. 1965, p. 33-38. 18 refs. In Russian.

Variation of the mineral composition of the Tamiya medium during growth of the alga Chlorella sp. K under laboratory conditions was studied. Consumption of nitrogen, potassium, sulphur, and iron from the medium in general proceeds at a uniform rate and corresponds to the algal growth rate. Removal of phosphates and magnesium from the medium during algal growth does not proceed at an uniform rate; this is probably due to precipitation of these elements due to alkalization of the nutrient medium. Along with an increase of pH, carbonate and bicarbonate ions are found to accumulate in the Tamiya medium during growth of Chlorella and evidently this accumulation counteracts any changes of pH or of the total concentration of the nutrient medium. The average amounts of nitrogen, phosphorus, sulphur, potassium, magnesium, and iron removed per gram dry weight of the alga are calculated on the basis of data pertaining to changes of the mineral composition of the Tamiya solution. From the data obtained one can determine the amounts of mineral salts that should be introduced into the medium at various periods of growth of the alga.

A65-80941
BIOLOGICAL PARAMETERS OF GROWTH CYCLE OF THE SYNCHRONOUS CULTURE OF A THERMOPHYLIC STRAIN OF CHLORELLA PYRENOIDOSA [O BIOLOGICHESKIKH PARAMETRAKH TSIKLA RAZVITIIA SINKHRONNOI KUL'TURY TERMOFIL'NOGO SHTAMMA CHLORELLA PYRENOIDOSA].
L. V. Spektorova (M. V. Lomonosov Moscow State U., USSR).
Fiziologiia Rastenii, vol. 12, Jan.-Feb. 1965, p. 27-32. 9 refs. In Russian.

The main physiological parameters of the development cycle of a synchronous culture of a thermophylic strain of Chlorella pyrenoidosa were determined under optimal temperature conditions (39^{0}) and illumination conditions (65 to 70 thousand erg/cm^2 sec.). The duration of a development cycle (from autospores to autospores) under optimal conditions was 9 to 9.5 hours. The minimal time required for illumination of the autospores before they became capable of dividing was 4 hours. The potentialities of the thermophylic Chlorella strain assessed on the basis of these parameters and on the maximal number of autospores produced per alga cell were found to be very large. Thus the increase of cell number per 24 hours is approximately 1100 times, and the dry biological mass increase may be 750 times. These figures are much greater than those encountered in a mass culture of this algal strain. It is concluded that the existing methods of culture may be considerably improved.

A65-80942
AUTOMATIC MAINTENANCE OF DEFINITE RANGE OF CO_2 CONCENTRATION IN THE PHOTOSYNTHETIC CHAMBERS [AVTOMATICHESKOE PODDERZHANIE POSTOIANNOGO DIAPAZONA KONTSENTRATSII CO_2 V USTANOVKAKH DLIA IZUCHENIIA FOTOSINTEZA RASTENII].
V. I. Rozhdestvenskii, V. G. Chuchkin, and A. F. Kleshnin (USSR, Acad. of Sci., K. A. Timiriazeva Inst. of Plant Physiol., Moscow).
Fiziologiia Rastenii, vol. 12, Jan.-Feb. 1965, p. 178-181. In Russian.

A device for automatic maintenance of stationary CO_2 concentration in a closed environmental system can be assembled from commercially available apparatus and can be easily constructed in a laboratory for photosynthesis study. The CO_2 concentration may be regulated by means of an automatic potentiometer which registers the CO_2 concentration changes and regulates valves which permit excape of CO_2 excess and the uptake of needed CO_2 from pressure cylinders.

A65-80943
A COMPARISON OF FREE-MOVING AND PRESSURE LEVERS IN A POSITIONAL CONTROL SYSTEM.
D. Burke and C. B. Gibbs (Defence Res. Med. Labs., Toronto, Canada).
Ergonomics, vol. 8, Jan. 1965, p. 23-29.

Ten subjects were used in comparative tests of pressure and free-moving control levers in a task of pursuit tracking, using a positional control system with zero lag. Pressure control was superior to free-moving lever at the p 0.01 level of confidence. Data are provided on the subjects' delays in responding to a step change of uniform velocity.

A65-80944
EYE NYSTAGMUS ELICITED BY STIMULATION OF THE CEREBRAL CORTEX IN THE RABBIT.
E. Manni, G. B. Azzena, and C. Desole (Sassari U., Ist. di Fisiol. Umana, Italy).
Archives Italiennes de Biologie, vol. 102, Nov. 10, 1964, p. 645-656. 34 refs.

A nystagmogenic center has been indentified in the temporo-occipital area of the cerebral cortex of rabbits. Low-frequency electrical stimulation of this center produced a horizontal eye nystagmus with the quick phase towards the opposite side. A change in head or body position did not affect the direction of nystagmus. The ocular nystagmus may continue after cessation of the stimulus as an afterdischarge without reversing its direction. The internal and external rectus muscles exhibited an antagonist electrical activity. The slow phase was characterized by an increase of discharge rate of single units with a recruitment of new units which were previously silent. The unit firing was asynchronous in the terminal part of the slow phase. The quick phase showed a short asynchronous outburst of spikes belonging to different units. The maximal frequency of unitary discharge was 48 per second at the end of the slow phase. The vertical recti and the oblique muscles were active also during the horizontal eye nystagmus brought about by cerebral stimulation and exhibited a synergistic activity with the horizontal rectus which presented the quick phase.

A65-80945
CHANGES IN THE AUDITORY INPUT IN WAKEFULNESS AND DURING THE SYNCHRONIZED AND DESYNCHRONIZED STAGES OF SLEEP.
W. Baust, G. Berlucchi, and G. Moruzzi (Pisa U., Ist. di Fisiol; and C.N.R., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).
Archives Italiennes de Biologie, vol. 102, Nov. 10, 1964, p. 657-674. 41 refs.
Grant PHS NB-02990-03.

In unanesthetized, free moving cats the amplitude of round window N_1 neural responses to clicks was correlated with the electroencephalogram, the cervical electromyogram, the electronystagmogram, and the animal's behavior. A tonic decrease of the amplitude of N_1, phasic reductions and/or complete abolition of N_1 are observed during desynchronized sleep and attentive wakefulness. Phasic reductions occur in most cases synchronously with the bursts of rapid eye movements or with the orienting reaction. The EMG of the middle ear muscles shows twitches in both tensor tympani and stapedius muscles during desynchronized sleep and attentive wakefulness. The phasic reductions of N_1 mentioned are always accompanied by these twitches. Furthermore, long lasting contractions of the middle ear muscles have been observed during desynchronized sleep. Cutting of the middle ear muscles abolishes the relation between the amplitude of N_1 and the different stages of sleep and arousal. It is concluded that the main differences in the responses to clicks between desynchronized and synchronized sleep and between sleep and wakefulness are caused by changes in the activity of the middle ear muscles.

A65-80946
CHANGES IN THE AUDITORY INPUT DURING AROUSAL IN CATS WITH TENOTOMIZED MIDDLE EAR MUSCLES.
W. Baust, G. Berlucchi, and G. Moruzzi (Pisa U., Ist. di Fisiol.; and C.N.R., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).
Archives Italiennes de Biologie, vol. 102, Nov. 10, 1964, p. 675-685. 22 refs.
Grant PHS NB-02990-03.

In unrestrained free moving cats with middle ear muscles tenotomized, the round window response to clicks was recorded during synchronized sleep and attentive wakefulness. Acute control experiments were performed either on decerebrate cats or on cats under nembutal anesthesia, in both cases after curarization. The following results were obtained: (1) In cats with chronically implanted electrodes, the neural cochlear responses are increased during attentive wakefulness with respect to those observed during synchronized sleep and relaxed wakefulness. (2) This increase can still be observed after cutting the crossed and uncrossed fibers of the olivocochlear bundle. (3) Homolateral section of the cervical sympathetic trunk has no influence upon the increase of N_1 during attentive wakefulness. (4) In decerebrate curarized cats, a rise in blood pressure, either produced by intravenous adrenaline or by sciatic nerve stimulation, does not affect the round window responses to clicks. (5) In cats under nembutal anesthesia, neither stimulation of the cervical sympathetic trunk, nor stimulation of the sympathetic center in the brain stem exerts any influence upon the round window response.

A65-80947
EQUILIBRIUM AND WALKING CHANGES OBSERVED AT 5, 7 1/2, 10 AND 12 RPM IN THE REVOLVING SPACE STATION SIMULATOR.
Bernard D. Newsom, James F. Brady, and Guy J. Goble (Gen. Dyn./Astronautics, Life Sci. Dept., San Diego, Calif.)
Aerospace Medicine, vol. 36, Apr. 1965, p. 322–326. 13 refs.

Rotation tolerance of man in space is difficult to analyze on earth because of the gravity artifact. In the operating space station centrifugal force will be nearly perpendicular to the floor and the velocity will be constant over the entire floor area. The data available in the literature have not considered these factors. The general acceptance of 4 rpm as a maximum rotation rate and 40 feet as a minimum radius is a severe design restriction for an early space station. Careful examination of all factors used to define these limits must be made in order to be sure the tolerances described are close as possible to those to be found in space. For this reason a revolving space station simulator was constructed by modifying a 220,000 g pound centrifuge. A room 7 x 8 x 14 feet was suspended at an 18-foot radius by trunnions so the resultant force would be normal to the floor. Preliminary results of the equilibrium and walking tests performed at rotation rates above the presently accepted limits demonstrate a learning process and suggest that postrotational decrement is attributable to the acquired compensatory responses.

A65-80948
EFFECTS OF TRANSIENT WEIGHTLESSNESS ON BRIGHTNESS DISCRIMINATION.
W. J. White (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.)
Aerospace Medicine, vol. 36, Apr. 1965, p. 327–331. 10 refs.
Contract AF 33(657)-11600.

Contrast thresholds of six semisupine, visually adapted subjects were obtained under short (10 to 14 sec) periods of weightlessness and under 1 g control conditions. The target, viewed binocularly, subtended 1.5° and the background 2.6°. Three background luminance levels were used: 0.03, 0.28 and 30.0 foot lamberts (ft-L). The contrast required to detect the target was found to be slightly, but consistently, lower under the weightless condition than under the control 1-g condition. Under the weightless condition the contrast required to detect the target averaged 12.56% at 0.03 ft-L background luminance, 6.49% at 0.28 ft-L background luminance and 3.99% at 0.28 ft-L background luminance. The corresponding contrasts required under the control 1 g condition averaged 15.14%, 7.05% and 4.45% respectively.

A65-80949
WHAT DOES SPACE FLIGHT TEACH US?
Jakob Eugster (Zurich U., Switzerland).
Aerospace Medicine, vol. 36, Apr. 1965, p. 345–350. 17 refs.

The following cosmological categorization, rather than one based on topography, is considered: (1) the influence of the entire cosmos on terrestrial life (cosmobiology in its narrowest sense); (2) biological conditions to which the space traveler is exposed (space medicine); and (3) exploration of the possibilities of life on other celestial bodies and in intervening space. Data accumulated in each of the above categories are reviewed, together with actual testing of possible hypotheses in (1) interplanetary space, (2) analytic studies of meteorites, and (3) Project Ozma (space probe aimed at fixed stars in other solar systems attempting to make radio contact with possible life forms).

A65-80950
SURVEY OF MILITARY SPORT PARACHUTING DEATHS.
Frank W. Kiel (Armed Forces Inst. of Pathol., Washington, D.C.)
Aerospace Medicine, vol. 36, Apr. 1965, p. 360–362.

Sport parachuting has become a popular activity with military personnel, and many clubs have been organized and sponsored on bases throughout the world. As the number of jumpers has increased so has the number of deaths increased. There were 27 military persons killed in sport parachuting through June 1964. In addition to the large problem of failure to activate the parachute there are other hazards such as hitting the airplane, colliding with another jumper, malfunctioning of the chute, and landing in the water. Analysis of the accidents shows that one-third occurred during the preliminary training period but jumpers with long experience have died too. Wind appears to be a factor in inadvertent water landings, but other weather factors lack importance.

A65-80951
SPORT PARACHUTING AND HYPOXIA.
Donald E. Courts and William R. Pierson (Lockheed-Calif. Co., Burbank).
Aerospace Medicine, vol. 36, Apr. 1965, p. 372–374.

This study was conducted to determine the effects of relatively mild hypoxia upon the intellectual and motor functions of subjects exposed to conditions experienced by parachutists when jumping above 10,000 feet. Six subjects were decompressed to 15,000 feet in a low pressure chamber and exposed at that altitude for 23 minutes. The subjects, who also acted as their own controls in subsequent experiments, were given three tests involving estimation of time duration, digit retention and repetition, and muscular reaction time. The subjects were then exposed to the same test conditions; however, this time with the use of supplemental oxygen. No significant difference in performance could be demonstrated between the test and control trials.

A65-80952
WATER AND ELECTROLYTES OF MAN IN HOT DRY REGIONS.
W. V. Macfarlane (Australian Natl. U., Canberra).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO, Paris, France, UNESCO, 1964, p. 43–53. 44 refs.

Estimates of the water consumption of infants in the dry tropics were made. Turnover of water exceeds 200 ml per kg per day in the first year. Adult water consumption and tritium oxide dilution were measured. Changes in body water and renal handling of electrolytes induced by work in the semi-desert are described. Early stages of renal response to heat are not explained by the action of vasopressin or aldosterone. Dysfunctions resulting from hot dry conditions, affecting infants and adults, are described: heat death, dehydration, and low-salt heat exhaustion.

A65-80953
AIR TRANSPORT OF PATIENTS WITH RESPIRATORY PARALYSIS; EXPERIENCE IN THE ROYAL AIR FORCE.
A. J. Merrifield (Royal AF Hosp., Ely, Cambridgeshire, England).
Aerospace Medicine, vol. 36, Apr. 1965, p. 374–375. 18 refs.

The development of the work is described, and the reasons for repatriating patients are discussed such as improved morale, better nursing, and family reunion. The mechanical limitations of transporting a tank respirator are mentioned and emphasis is placed on establishing a confident relationship with these patients, particularly when they are weaned from the tank respiratory to the cuirasse. Both this respirator and the pump type used on patients with a tracheostomy are described. Mention is made of the necessity for good team work, and the clinical management of patients during flight is outlined.

A65-80954
ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, 400 p.

This symposium on physiology and psychology in arid and semiarid conditions was held at Lucknow (India) from 7 to 13 December 1962. This volume contains fifty original contributions presented by scientists attending the meeting. The papers are grouped into the following sections: (1) medical climatology, (2) water and electrolytes, (3) nutrition and heat, (4) physiological anthropometry, (5) performance and comfort standards, (6) comparative physiology, (7) significance of solar radiation, (8) neurophysiology of heat exposure, and (9) psychological aspects of life in hot climates.

A65-80955
THE AETIOLOGY OF CANE CUTTERS CRAMPS IN BRITISH GUIANA.
C. S. Leithead and E. R. Gunn (Liverpool U., School of Trop. Med., Great Britain).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 13–17. 11 refs.

A preliminary survey of muscle cramps suffered by sugarcane cutters in the coastal strip of British Guiana is presented. The results show that cane cutters' cramps in the latter area differ in no obvious way from other studies of cane cutters' cramps, mill cramps, and stokers', miners', and firemen's cramps. In short, they appear to be heat cramps, resulting from hard physical work in hot surroundings, and associated with thermal sweating and the drinking of unsalted fluids.

A65-80956
THE ENVIRONMENT AND HUMAN HEALTH.
F. Sargent, II (Ill. U., Dept. of Physiol. and Biophys., Urbana).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 19–32. 68 refs.

The study of human ecology, the interaction between man and his environment, is indispensable to any rational generalization on human health. Man lives in a complex habitat which includes the internal and the external environment. The internal environment consists of an aqueous medium

with critical chemical and physical properties which bathes all cells of the organism. The four major components of the external medium are the material, the biotic, the cultural, and the conceptual. These different aspects of the environment are defined and studied in detail. Health is defined as the state in which the regulatory mechanisms of the organism function as efficiently as possible. An ecological model of health and disease is described. Environmental aggressions on human health from the viewpoint of the distribution of disease in time and space are studied. It is concluded that the ecological complexes involve an alteration of the organism and the appearance of disease. The principal job of specialists of human ecology consists in revealing the causes of these alterations in regulatory functions.

A65-80957
SODIUM REQUIREMENTS IN ISRAEL UNDER CONDITIONS OF WORK IN HOT CLIMATE.
E. Sohar and R. Adar (Tel-Hashomer Hosp., Climatic Res. Unit, Israel).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
ditions.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium supported by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 55–62. 35 refs.
Grant Ford Found., Israel, F-3.

Four experiments which covered extremes of heat load, physical work, and sodium intake in various combinations so as to represent almost the whole population of Israel were carried out during the summer months of 1959 and 1960. No clinical or laboratory evidence was found to indicate salt deficiency in any of the groups tested. The concept of an isolated salt-deficiency heat exhaustion is criticized. The balance evidence in the literature tends to discredit the idea that salt depletion may arise as a result of excessive loss of sodium chloride in the sweat, in healthy acclimatized subjects eating normal diets. Evidence as to "inability of the unacclimatized to conserve salt" has been reported in the literature.

A65-80958
DYNAMIC CHANGES IN SWEAT ELECTROLYTE COMPOSITION INDUCED BY HEAT STRESS AS AN INDICATION OF ACCLIMATIZATION AND ALDOSTERONE ACTIVITY.
K. I. Furman and G. Beer (Negev Inst. for Arid Zone Res., Physiol. Unit, Beersheba, Israel).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 63–68. 8 refs.

Three heat-acclimatized and three relatively less heat-acclimatized persons were exposed to single two-hour heat stress exposures. Serial forearm sweat samples were collected during successive half-hour periods of the test for determination of sodium and potassium content and the ratio Na/K. Dynamic changes in the concentrations of these electrolytes and a progressive rise in their ratio was greater in the less acclimatized as compared to the relatively more acclimatized persons who tended to maintain a steadier state of sweat electrolyte secretion. A two-week stress acclimatization procedure resulted in a progressive decrease in dynamic electrolyte changes during exposure to heat stress. This decrease was effectively overcome by the administration of the aldosterone antagonist Aldactone. Two patients with congestive cardiac failure and presumed secondary aldosteronism were subjected to heat stress exposures. Following the administration of Aldactone to these patients, greater sweat sodium concentrations were effected, as well as dynamic changes in the sweat sodium and potassium levels, reflected in a progressive rise in the ratio Na/K. It is suggested that the dynamic pattern of changes in the sweat sodium and potassium concentrations and the ratio Na/K is an indication of acclimatization and/or aldosterone activity.

A65-80959
WATER, SODIUM, AND POTASSIUM LOSSES THROUGH SWEATING DURING WORK IN THE SAHARA [L'EXCRETION DES ELECTROLYTES PAR LES VOIES SUDORALES ET URINAIRES EN CLIMAT SAHARIEN].
B. Metz, M. Hasselmann, J. P. Simon, R. van Hove, and G. Lambert (Centre d'Etudes de Physiol. Appl. au Travail, Strasbourg, France).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 69–74. In French.

During the summer season, daily sweat losses of men working for eight hours a day in the Sahara desert, but otherwise living in air-conditioned dwellings, are of the same magnitude as those encountered in people working under hot-dry conditions in factories or mines of the temperate zone. The benefit ensured by cooling the living quarters amounts to a daily economy of more than 2 liters of sweat in the summer season. For acclimatized Europeans as well as for native Saharan tribesmen, the sodium concentrations are lower in the sweat than in the plasma, while the potassium concentrations are much higher in the sweat than in the plasma. European subjects, whose sweat losses amounted to an average of 7 liters a day, were able to maintain their salt balance in equilibrium with daily sodium intakes of less than 250 milliequivalents. The comparison of the Na/K ratios found respectively in the ingested foods and fluids, in the urine, and in the sweat samples suggests that Na and K losses in sweat may be subjected to a special regulatory process.

A65-80960
DIURNAL AND SEASONAL METABOLIC CHANGES IN ACID-BASE BALANCE OF BLOOD FROM HUMAN SUBJECTS LIVING IN A HOT CLIMATE.
S. Samueloff, J. Magnes, A. Lehman, and E. Vider (Hebrew U., Hadassah Med. School, Jerusalem; and Negev Inst. for Arid Zone Res., Beersheba, Israel).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 81–88. 36 refs.
Bath-Sheba de Rothschild Found. supported research.

Metabolic changes in acid-base balance throughout varying seasonal climatic conditions are investigated. The study was carried out on two groups of volunteer subjects: (1) inhabitants of Beersheba, and (2) workers at the Potash Company at Sdom, situated on the shores of the Dead Sea. Beersheba is the main town of the Neger, which is the southern arid desert region of Israel. It is located on a plane 275 meters above sea level; 87 kilometers to the west, the ground descends to the Dead Sea, which is the lowest plane in the world—392 meters below sea level. The average daily temperature during the summer is approximately 30°C for Beersheba and reaches an average of 40°C at the Dead Sea. During the summer months the acid-base balance shifts to the acid side as suggested by the lowering of the alkaline reserves of the blood. A correlation with climatic conditions is emphasized by the fact that this shift is more pronounced in the group examined at Sdom, where the subjects are exposed to higher temperatures. The decrease in CO_2 combining power appears with a definite lag relative to the elevation of environmental temperature. As to the acid-base balance after work, a significant rise in CO_2-combining power as compared to the basal state was observed during most of the year, but not during the summer months in the Beersheba group. On the other hand, subjects working at Sdom developed a relative metabolic alkalosis during the hot season.

A65-80961
EFFECT OF HOT, DRY, DESERT WINDS (SIROCCO, SHARAV, HAMSIN) ON THE METABOLISM OF HORMONES AND MINERALS.
F. G. Sulman, N. Hirschman, and J. Pfeifer (Hebrew U., Hadassah Med. School, Jerusalem, Israel).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 89–95. 12 refs. Hadassah Med. Organ., Florina Lasker Fund supported research.

The urinary hormone level of eight volunteer scientists was studied for four years under hot spell conditions and compared with that under normal climatic conditions. The findings of daily urine examinations on the hot days showed: 5-hydroxy-indole acetic acid excretion decreased; sodium excretion decreased; potassium excretion increased; 17-ketosteroid excretion decreased; and 17-hydroxycorticosteroid excretion increased. Adrenaline and noradrenaline excretion differed between veteran residents and new immigrants, in that an increase was noted among the newer arrivals and a decrease among oldtimers and middle-aged native-born Israelis. These changes are interpreted as stress reactions to Sharav conditions, which bring about an alarm reaction throughout, whereupon the tourist or immigrant enters into the phase of defense while the oldtimer or middle-aged native-born Israeli reacts by exhaustion. The main reaction centers of the body towards Sharav thus are the adrenal medulla, the adrenal cortex, and the hypothalamus. To counteract the unpleasant effects of the Sharav an individual approach is required in each case, according to the respective hormone reaction. A useful temporary regime is ample water and salt to replenish sweat loss and sugar to counteract potassemia.

A65-80962
A COMPARATIVE STUDY OF THE RESPONSES AND ADJUSTMENTS OF THE HUMAN FEMALE AND MALE TO HOT ATMOSPHERES.
F. Sargent II and K. P. Weinman (Ill. U., Dept. of Physiol. and Biophys., Urbana).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.

(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 157–161. 22 refs.

Human female and male responses to hot environments were investigated experimentally and through a literature search. The following physiological aspects were included: (1) cardiovascular system (pulse rate, blood pressure, cardiac output, body water, metabolic heat conductance), (2) thermoregulatory system (skin temperature, rectal temperature, sweat rate, sweat gland response to mecholyl, metabolic rate), (3) acclimatization to heat, and (4) tolerance to heat. Thermoregulatory and cardiovascular differences between the male and female under heat stress are described. Both sexes were found to acclimate to heat. However, conflicting observations and opinions were obtained with respect to tolerance to heat. Future investigations must be carried out with male and female subjects under identical conditions of environment (heat, humidity, air velocity), diet, activity, and state of acclimatization. By so doing, more comparable data may be obtained and accurate conclusions may be reached as to the relative tolerance of the male and female to heat stress.

A65-80963

CHANGES IN ACID-BASE BALANCE INDUCED BY EXPOSURE TO HOT, ARID CONDITIONS.

R. A. Kenney (Singapore U., Fac. of Med., Dept. of Physiol., Malaysia).

IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.

(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 75–79. 29 refs.

Exposure to hot, arid conditions threatens bodily economy of both volume and tonicity of body fluids. The homeostatic responses to these two deviations involve renal operations on water and solutes of extracellular fluid. As a result of sweating, and under the influence of aldosterone, there is an elevation of the extracellular concentration of sodium ions, with a consequent entrance of the latter into the cell in exchange for potassium and hydrogen ions. The resulting elevation of extracellular potassium concentration facilitates the renal conservation of sodium at the expense of a general potassium depletion. The extent of the potassium depletion is conditioned in part by the availability of hydrogen ions. The chemical control of respiration is also effected by the intracellular hydrogen ion concentration of the receptor portion of the respiratory center. An increase in respiration is produced by an increased acidity of the blood. An increase in blood temperature of 1°C is known to produce a change in blood pH, towards acidosis. The hyperventilatory response to excess heating however, leads to an overenthusiastic homeostatic reaction and alkalosis of the blood. For this response, a depletion of extracellular fluid volume is proposed.

A65-80964

CONTRIBUTION TO THE STUDY OF THE POPULATIONS OF THE SAHARA [CONTRIBUTION A L'ETUDE DES POPULATIONS NOMADES DU SAHARA].

A. Coblentz (Fac. des Sci., Lab. d'Anthropol., Paris, France) and H. Pineau (Centre Natl. de la Rech. Sci., Paris, France).

IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.

(Arid Zone Research. XXXV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 175–180. In French.

The principal characteristics of the following five groups of nomadic population were studied: the Mekhadma of the Ouragla area, the Chaamba of Metlili des Chaamba and of Ghardaia, the Reguibat examined in the Tindouf area, the Goranes of the districts of Borkou-Ennedi-Tebesti (Republic of Chad), and the Toubous of the Tibesti (Republic of Chad). Each of these groups was compared with the others for a certain number of characteristics (stature, weight, height when seated, length of upper limb, nasal index) by two different methods, a graphic and a statistical method. The two techniques revealed a fundamental dissociation between the Toubous and the Goranes, on the one hand, and the Reguibat, Chaamba, and Mekjadma on the other. Furthermore, differences were noted even within the two groups. The Toubous, for instance, gave lower values than the Goranes for all characteristics; but these disparities are probably connected with ecological differences. As for the three other groups, the Reguibat, although undoubtedly belonging to the white population, must be classed separately from the other two samples. The results tally with those obtained in other surveys, particularly as regards aptitude for work, in which respect the Reguibat come in a separate category from the other nomadic peoples of the Sahara.

A65-80965

ELECTROENCEPHALOGRAPHIC CHANGES OBSERVED IN ADULTS LIVING TEMPORARILY IN A DESERT CLIMATE [MODIFICATIONS DES TEMPS DE REACTION ET DE L'ELECTRO-ENCEPHALOGRAMME AU COURS D'UN SEJOUR PROLONGE EN ZONE ARIDE].

G. E. Lambert (Center of Study and Inform. of Human Probl. in Arid Zones, Paris, France).

IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.

(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 363–369. 9 refs.

Electroencephalograms taken from four individuals during a two month sojourn in the desert are analyzed. The general situation, such as bewilderment, relative isolation, silence, monotony, etc., may have been the cause of the sleep-like brain-wave pattern observed in conscious individuals. Climatic and individual factors apparently caused differences in the psychomotor reaction times (visual and auditory) measured simultaneously with the electroencephalograms. The results may be summarized as: (1) an average correlation of 0.61 between the average visual and auditory reaction times, but a stronger correlation in two of the subjects; (2) nocturnal reaction times significantly longer than diurnal; (3) lengthening of reaction time in all subjects during the hottest season; (4) decreased reaction time with rising temperature up to 35°C, but sharply increased reaction time with temperature above 35°C; (5) persistence of the effects of the hot season on the following season; and (6) greater sensitivity of auditory reaction time to external factors.

A65-80966

COMPARATIVE PSYCHOLOGICAL BEHAVIOU. OF GROUPS OF YOUNG EUROPEAN ADULTS IN THE ARID ZONE [COMPORTEMENT PSYCHOLOGIQUE COMPARE DE GROUPES DE JEUNES ADULTES EUROPEENS EN ZONE ARIDE].

H. J. Cottin (Center of Study and Inform. of Human Problems in Arid Zones, Paris, France).

IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.

(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 381–388.

From 1959 to 1962, several groups of young men living in the Sahara in different conditions were studied from the point of view of their psychological behavior. The climatic conditions were approximately the same for all groups (four months of intense heat with an average maximum temperature of over 40°C in the shade). From the observations as a whole it emerges that the direct influence of climatic factors on the behavior of the individual is slight; it is through the factors inherent in the situation (isolation, structure of the groups, etc. that they play an important part, as environmental elements. When a group is obliged to live without comfort under harsh environmental conditions, its adaptation is closely dependent upon the extent of its internal organization. On the other hand, when a group is well protected from a hostile environment, satisfactory adaptations will be linked with the amount of comfort available and with the level of activity of the members of the group.

A65-80967

TECHNICAL PROBLEMS AND MEANS OF PROTECTION AGAINST HEAT (SOLAR) RADIATION.

E. A. Müller (Max-Planck-Inst. für Arbeitsphysiol., Dortmund, Germany).

IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.

(Arid Zone Research XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 335–336.

Protection against radiant heat will be generally sufficient if heating of the worker by radiation is reduced to less than 30 kcal per hr. This is usually done by protecting screens. The protecting power of several screens has been calculated. The screen should have a height of 2 meters, a width of 1.5 meters, and be placed at a distance of 2 meters from the worker. A table giving the protecting power and temperatures of screens for a 20° C air-and wall-temperature of the room is included. Oxidized sheets are cheap and do not need to be cleaned. Polished sheets lose their reflecting power if they become greasy or dusty and have the disadvantage of reflecting heat to other places. Two oxidized sheets with glass wool or air between them are the simplest solution, and are highly efficient. Since the sheet on the radiation side becomes rather hot, cooling the screen by air or water might allow the worker to lose heat by radiation to the screen. Water-cooled screens remove heat out of the workshop while all other screens disperse it in the room.

A65-80968

SALT REQUIREMENTS OF ACCLIMATIZED PEOPLE DURING SUMMER IN THE TROPICS.

M. S. Malhotra (Metcalfe House, Defence Sci. Lab., Delhi, India).

IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.

(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 97–99. 7 refs.

Research performed in India, both in the laboratory and in the field to assess salt requirements of acclimatized people during the summer is presented. The laboratory studies were conducted on 24 subjects, who were divided into 5 groups and were maintained on rations supplying 16.2, 11.2, 8.7, 6.2, and 3.1 g of salt daily for different groups. The subjects were made to march in the open sun for 2 hours daily at a speed of 3.5 mph. The mean maximum temperature during the trial on different groups was 107.5°, 106.7° 105.3°, 97.8°, and 100.7° F, respectively. The mean relative humidity ranged from 40% to 54%. Symptoms of salt deficiency were noticed in 5 out of 6 subjects on salt intake of 3.1 g per day. Blood tests revealed a change, thiocyanate space decreased by 2.1 liters, and plasma chloride by 8.51%. In addition, chloride concentration in the urine also dropped to below 3 g per liter and urine volume to 0.43 liters per day. The next higher intake on which no changes were observed, i.e., 6.2 g could be taken as an adequate amount under experimental conditions. These studies revealed further that there was a significant linear relationship between sweat loss and dry-bulb temperature of the environment. To confirm these findings other investigations, including a field trial on 30 shoulders for 7 days and studies on Indian naval ratings working in the ship's engine room and galleys where the environmental temperature ranged from 1.5° to 119° F, were carried out. Positive results were obtained.

A65-80969
NITROGEN METABOLISM AND BODY TEMPERATURE IN MAN UNDER COMBINED RESTRICTION OF FOOD AND WATER.
F. Grande (Minn. U., Lab. of Physiol. Hyg., Minneapolis).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 103–114. 43 refs.

The extent of water conservation which can be attained without endangering the efficiency of the thermoregulatory mechanism is investigated. The effects of the restriction of water on nitrogen metabolism is also studied. The experimental plan called for 3 periods as follows: a control period of 21 days, a semistarvation period of 16 days, and a rehabilitation period of 15 days. In the first experiment, 13 subjects received water ad libitum throughout the semistarvation period, while in the second experiment 6 men (low water group) received only 900 ml of water per day for 5 days starting with the first day of water restriction. The other 6 men in this experiment (high water group) received 1800 ml of water per day for 10 days, starting with the first day of food restriction. Two hours of treadmill walking per day were maintained throughout the three experimental periods. The exercises were performed in an air-conditioned room. A pronounced water conservation was observed in the low water group produced by several factors of water loss (urine, sweating during physical exercise, insensible water loss). In the same subjects a high elevation of rectal temperature was observed superior to that obtained in non-water-restricted subjects. In the men receiving 900 ml of water per day a marked augmentation in the urine content of nitrogen was produced. The increased nitrogen excretion during dehydration may be considered an example of the catabolic response to stress. Very substantial savings in loss of water from the body were achieved. Since these savings are several times larger than the increased loss through the kidneys, because of increased protein catabolism, this loss of water does not appear to be of much importance in the total water economy of the body. The reverse may be true in men exposed to a dry, hot environment.

A65-80970
ENERGY REQUIREMENTS OF MEN IN EXTREME HEAT.
C. F. Consolazio and R. Shapiro (U.S. Army Med. Res. and Nutr. Lab., Fitzsimons Gen. Hosp., Denver, Colo.)
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962.) Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 121–127.

A study was performed in extreme heat on 8 healthy young adults for 3 consecutive 10-day periods. In Period I daytime temperatures in the hot sun averaged 40.5° C, in Period II in the hot shade, 40.3° C, and in Period III in the cool shade 26.0° C. The men were on a constant daily activity but were allowed food and water ad libitum. Significant increases were observed in food consumption and the actual caloric requirements were even greater because of changes in the body composition of the men. The differences in energy cost of the various resting and exercise activities, when comparing the hot-sun or hot-shade to the cool-shade phase were significantly different. Energy requirements averaged 55.5, 56.4, and 36.6 calories per kilogram of body weight, when corrected for body composition changes. These increased requirements are probably due to the increased heat load imposed on the body by solar radiation and extreme heat. Increased action of the blood in heat transport, increased action of the sweat glands, plus the increased metabolic rate due to the elevation in body temperature are probably involved.

A65-80971
SOME ANTHROPOMETRIC STUDIES ON INDIANS IN A TROPICAL CLIMATE.
Rabindra Nath Sen (Central Labour Inst., Physiol. Div., Bombay, India).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium supported by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p 163–174. 32 refs.

Forty-one different anthropometric measurements were taken on 31 normal naturally acclimatized subjects consisting of 15 adult male and 7 adult female students and 9 children of the eastern zone of India. In addition to these measurements 22 different other anthropometric measurements were also taken on 40 naturally acclimatized Indian workers of the western zone. The values were compared with those of Westerners. Significant difference between the body form of the people in tropical country and that of the people in cold climates was observed. This was presumed to be the effect of tropical climate in providing for greater evaporative or radiating surface and lesser heat-producing cell mass.

A65-80972
BETWEEN-GROUP DIFFERENCES IN THERMAL COMFORT STANDARDS.
R. K. Macpherson (Sydney U. School of Public Health and Trop. Med., Australia).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 213–219. 17 refs.

Thermal comfort was assessed by means of the comfort-vote technique (seven-point rating scale of thermal comfort) by residents of Sydney and Batchelor (two similar groups living under very different climatic conditions), and Batchelor and Darwin (two similar groups living under the same climatic conditions). After analysis it was shown that the comfortable votes for Sydney were normally distributed around a mean of 73° F dry-bulb temperature. However, at best only 80% of the population were comfortable at any one time, with about 10% on the warm and 10% on the cold side of comfort. Also there was a small summer-winter difference in preferred temperature. The curves for Batchelor and Darwin lie to the right of Sydney with the preferred temperatures at 77° and 79° F, respectively, at which temperature in each case 10% of the voters were too warm. It is concluded that it is possible to demonstrate differences in thermal comfort independent of race, diet, nutritional level, and way of life. Acclimatization and clothing may be of importance.

A65-80973
BLOOD LACTATE CONCENTRATION OF BENGALI YOUTHS BEFORE AND AFTER MAXIMAL WORK AT 900 KG.M. PER MINUTE.
S. R. Maitra and S. N. Koyal (U. Coll. of Sci., Dept. of Physiol., Calcutta, India).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 231–234. 12 refs.

In order to show the degree of stress of maximal work done in a tropical climate, blood lactate concentrations were measured in Bengali youths. Twenty males (20 to 32 yrs) worked on a bicycle ergometer at 900 kg m per min until fatigued and exhausted. Pulse rate, respiratory rate, and pulmonary ventilation were measured also. Lactic acid in the blood rose from the resting average of 20 mg/100 cc to an average of 78 mg/100 cc after a total workload of about 3284 kg m per min. Pulse rate increased from 76 per min to 175 per min. Respiratory rate and pulmonary ventilation also showed large and significant increases. In comparison to other similar studies in temperate climates, the rise of lactic acid in the Bengali males was less. The subjects were not trained, and it is thought that the smaller rise in lactic acid is due to the oppressive environmental conditions of heat and humidity which keeps the physical activity at low levels for most of the year.

A65-80974
SOME PHYSIOLOGICAL RESPONSES IN MEN TO ENVIRONMENTAL STRESS OF ALTITUDE.
S. Lahiri (Presidency Coll., Dept. of Physiol., Calcutta, India).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 235–240. 76 refs.

A series of experiments were carried out on men acclimatized to an altitude of 19,000 ft for at least 6 weeks. As part of the Hillary expedition to the Himalayas in 1960 to 1961, the experiments were performed to study the mechanism of acclimatization to hypoxia and the effects of prolonged exposure to altitude. Determinations of blood changes were made as well as measurements of oxygen capacity and saturation in the blood with and without exercise. Cardiac output was observed at sea level and in exercise at altitude.

Hematocrit, total red blood cell mass, and hemoglobin all showed characteristic increases. Oxygen capacity at altitude increased from 3% to 7% with exercise, but arterial oxygen saturation fell off at maximum work. Cardiac output decreased with increasing work levels at altitude despite the acclimatization and constant oxygen consumption. The oxygen pressure values in the transport system totaled less than the environmental pressure drop, but alveolar oxygen pressure increases with exercise. These factors and others concerning oxyhemoglobin and venous oxygen tension are adaptations to maintain the highest possible capillary oxygen pressure. Further discussion is given of hyperventilation, hemoglobin, and the interactions with carbon dioxide tension.

A65-80975
SOLAR HEAT GAIN BY MAN IN THE HIGH HIMALAYA.
L. G. C. E. Pugh (Natl. Inst. for Med. Res., Med. Res. Labs. Hampstead, London, Great Britain).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 325–350. 5 refs.

Based on metereological observations made in the Himalayas during 1960 to 1961, a method is presented for estimating the solar heat gain by man. Both direct and reflected radiation were observed, and results are compared to solar heat gain in deserts and cold climates. The maximum value at 19,000 ft was 1.044 kcal per m_2 per hr. Values were greater with snow on the ground. Heat gain in the Himalayas was greater than at sea level in the desert. In comparing heat gain in cold climates such as Antarctica, longwave radiation from surrounding objects is treated separately. Insulation by clothing is discussed and values for clothing surface and skin temperatures under high solar radiation are given. The importance of evaluating longwave radiation exchanges is stressed.

A65-80976
WATER-SALT METABOLISM IN HOT CLIMATES.
A. Y. Yunusov (Acad. of Sci., Inst. of Regional Exptl. Med., Dept of Physiol., Tashkent, Uzbek SSR).
IN: ENVIRONMENTAL PHYSIOLOGY AND PSYCHOLOGY IN ARID CONDITIONS.
(Arid Zone Research. XXIV. Proceedings of the Lucknow Symposium, 1962). Symposium sponsored by Central Drug Research Institute, India, and UNESCO. Paris, France, UNESCO, 1964, p. 357–361. 6 refs.

Water-salt metabolism was investigated in dogs subjected daily to ambient temperatures of 33° to 40° C before or after feeding. After feeding normally, the volume of digestive juices increases together with their chloride and calcium content. At high temperature in a preprandial state there are considerable changes in the water and salt metabolism whereby both are discharged mainly through saliva, whereas in the postprandial state water and salts are discharged to a lesser extent and mainly in the urine. High temperatures inhibit the intestinal secretion, which however is less evident in the fed animals. Feeding also has a facilitatory effect on adaptation to heat, resulting in smaller losses of water and salts through saliva and urine. At high temperatures the intestine assumes the role of a temporary water and salt depot. Experiments with decorticated and semidecorticated dogs point to the special role of the cerebral cortex in the regulation of water-salt metabolism, adjusting it to the requirements of the organism and environment.

A65-80977
HABITABLE PLANETS FOR MAN.
Stephen H. Dole (Rand Corp., Santa Monica, Calif.)
New York, Blaisdell Publishing Co., 1964, xiii + 158 p.
$5.75.

This book attempts to spell out the requirements of planets on which human beings as a biological species can live, and to discuss the essential properties required of the stars which provide heat and light. The nine chapters deal with space and the solar system, human requirements (temperature, light, gravity, water, atmospheric composition, and pressure), physical properties of the planets, probability of occurrence of habitable planets, discussion of the 43 stars with a reasonable likelihood of having habitable planets, and changes affecting men in new environments. A 6-page appendix contains physical data on the 25 principal bodies of the solar system of mass greater than 10^{23} grams.

A65-80978
A CLINICAL–EXPERIMENTAL STUDY OF MUSCLE CRAMPS DURING PHYSICAL FITNESS EXAMINATION OF EIGHTEEN YEAR OLD AVIATION CADETS WITH PARTICULAR ATTENTION TO JOINT DAMAGE [KLINISCH-EXPERIMENTELLE STUDIE UBER MUSKELCRAMPIBEI PREVENTIVEN UNTERSUCHUNGEN ACHTZEHNJAHRIGER FLIEGER-ADEPTEN MIT BESONDERER BERUCKSICHTIGUNG DER GELENK-SCHADIGUNG].
V. Lukes (Palacky U., Neurol. Klin., Olomouc, Czechoslovakia).
Acta Universitatis Palackanae Olomucensis, Facultatis Medicae. vol. 34, 1964, p. 249–261. 11 refs. In German.

Fifty-five aviation cadets and 13 pilots suffering from muscle cramps and 54 healthy controls were investigated neurologically. Of provocation tests, only the Barré II Test (maximum apposition of heels to the hips for one minute) and the Barré III Test (the same as above but done against the experimenter's resistance) were successful in evoking muscle cramps in predisposed individuals. Anamnesis in 45 individuals of the experimental group pointed to trauma to the lower limbs particularly the joints sustained 1 to 2 years before the onset of cramps. Provoked cramps appeared usually on the traumatized side but not necessarily in the same locus as spontaneous cramps. Pathogenesis is conceived to lie in (1) an impaired or grossly atypical complex position sense primarily through joint receptors, and (2) a lack of adaptability of the motor analyzer to the atypical situation. The latter results either from a strong conflict between the atypical joint and muscle proprioception which is out of line with the regular motion stereotype, or from a weakened central structure of the motor analyzer by fatigue, sleep, puberty, etc. Therapy is aimed at interrupting the pathological stereotype.

A65-80979
CHANGES IN THE BLOOD SEROTONIN CONTENT IN ANIMALS, CAUSED BY THE IONIZING RADIATION AND THE DYNAMIC FACTORS OF FLIGHT [IZMENENIE KONTSENTRATSII SEROTONINA V KROVI ZHIVOTNYKH POD VLIIANIEM IONIZIRUIUSHCHEI RADIATSII I DINAMICHESKIKH FAKTOROV KOSMICHESKOGO POLETA].
V. V. Parin, V. V. Antipov, M. O. Raushenbakh, P. P. Saksonov, V. S. Shashkov, and G. A. Chernov.
(VI International and XII European Congresses of the Aviation and Space Medicine, Rome, Oct. 1–15, 1963).
Izvestiia Akademii Nauk SSSR Seriia, Biologicheskaia, no. 1, Jan.–Feb. 1965, p. 3–9. 28 refs. In Russian.

Whole-body irradiation by Co^{60} γ-rays caused a considerable drop in the blood serotonin content in monkeys, dogs, and guinea pigs and only a slight reduction in rats and mice. The reason for this decrease was evidently a decrease in the serotonin production in the alimentary tract. In dogs and mice, which had been on board the Soviet spaceships No. 4 and No. 5, the blood serotonin dropped to about one-tenth of the normal value 48 hrs after the reentry. Normalization occurred 10 days after the return. In dogs the normal values remained during the following 240 days. In mice and guinea pigs subjected to vibrations of 35 to 70 cps for 15 min, with 10 g and 0.4 mm amplitude, the blood serotonin content fall was noted during the first two days after the experiment, with a subsequent normalization. The authors assume that the vibration effect was the major factor during the space flight which determined the changes.

A65-80980
PHYSIOLOGICAL EFFECT OF WEIGHTLESSNESS ON HUMAN ORGANISM [O FIZIOLOGICHESKIKH MEKHANIZMAKH VLIIANIIA NEVESOMOSTI NA ORGANIZM CHELOVEKA].
I. I. Kas'ian and V. I. Kopanev.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 1, Jan.–Feb. 1965, p. 10–17. 42 refs. In Russian.

Experimental data and information gained during actual space flights on the effect of weightlessness on man are summarized. This effect can be direct or indirect. As a direct effect, the changes of the physical state must be considered. The absence of gravitational pull eliminates the hydrostatic pressure and results in the loss of the functional value of the otoliths, disturbs the coordination of body movements, including respiration, and affects the relative disposition of vital organs. Weightlessness causes a disturbance in the afferent impulses from the receptors to the brain centers, particularly cutaneous and vestibular. It interfers with the coordination of analyzer functions, and distorts the state of the central nervous system. This results in functional changes of the efferent routes leading to vital organs and motor units. The total result is a shift in all biochemical processes, body movements, and mental attitudes. The vestibular effect produces persistent motion sickness. However, training under conditions of weightlessness produces adaptation to these influences, although this adaptation does not have a stable character.

A65-80981
EFFECT OF CORIOLIS ACCELERATION ON HUMAN BLOOD CIRCULATION [NEKOTORYE SOSUDISTYE REAKTSII CHELOVEKA PRI DEISTVII USKORENII KORIOLISA].
R. A. Vartbaronov.
Izvestiia Akademii Nauk SSSR, Seriia Biologicheskaia, no. 1, Jan.–Feb. 1965, p. 18–22. 14 refs. In Russian.

The coriolis acceleration effect on blood vessels was studied in subjects placed in revolving chairs and instructed to move their heads or trunks. The subjects felt a faint sensation of motion sickness. The tonus of arterial, or sometimes venous, capillaries increased. This effect depended upon the duration of the acceleration exposure, the degree of stimulus, and the sensitivity of the vestibular apparatus. The coriolis effect on the vestibular apparatus resulted in a decrease of peripheral blood flow, because of changes in hemodynamics. The most pronounced effect was noted in the skin vessels of the head. These changes in the peripheral blod flow could be used as an index of changes in vestibular function.

A65-80982
VELOCITY OF THE QUICK COMPONENT OF NYSTAGMUS DURING RHYTHMIC ELECTRIC STIMULATION OF THE AMPULLAR RECEPTOR (RELATIONSHIP BETWEEN QUICK COMPONENT AND VESTIBULAR APPARATUS) [SKOROST' BYSTROGO KOMPONENTA NISTAGMA PRI RITMICHESKOI ELEKTRICHESKOI STIMULIATSII AMPULIARNOGO RETSEPTORA (K VOPROSU O SVIAZI BYSTROGO KOMPONENTA S VESTIBULIARNYM APPARATOM)].
M. M. Levashov (USSR, Acad, of Sci., I. P. Pavlov Inst. Physiol., Physiol. Lab. of Auditory Anal., Leningrad).
Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 59, Jan. 1965, p. 6–10. 15 refs. In Russian.

Nystagmus was evoked in rabbits by a rhythmic stimulation of the ampullar receptor with a 10 to 60 cps current. Bipolar electrodes were placed in the ampulla of the horizontal semicircular canal. The results showed that at a certain frequency the quick component reached its maximal velocity. The velocity of the slow component increased progressively with the increase in frequency. There was a direct relationship between the quick nystagmic component and the state of the vestibular apparatus.

A65-80983
IMPORTANT EXPERIMENTS IN SPACE [VAZHNYE EKSPERIMENTY V KOSMOSE].
B. Egorov.
Aviatsiia i Kosmonavtika, no. 12, Dec. 1964, p 34–38. In Russian.

The medical tasks of the crew members during the Soviet three man space flight consisted of: (1) study of the functional state of the central nervous system and of the degree of performance of each crew member during various flight stages; (2) investigation of the effects of complex factors of cosmic flight on cardiovascular system activity and on blood biochemistry; (3) study of external respiration, gas-exchange, and energy expenditure, and of the functional state of analyzers during weightlessness; (4) observations concerning the effectiveness of life-support systems during flight and reentry. These tasks were accomplished with the aid of telemetric devices. In addition, the physician on board was provided with suitable instruments for registering various physiological parameters, and for carrying out biochemical analyses. The medical officer also supervised the control of the ambient air and of the diet and observed physiological reactions of each crew member, including his own.

A65-80984
STUDY OF MOVEMENT COORDINATION IN HANDWRITING DURING SPACE FLIGHT [ISSLEDOVANIE KOORDINATSII DVIZHENIIA PRI PIS'ME V USLOVIIAKH KOSMICHESKOGO POLETA].
A. I. Mantsvetova, L. P. Neumyvakin, V. F. Orlova, V. A. Trubnikova, and L. M. Freidberg.
Kosmicheskie Issledovaniia, vol. 3, Jan.–Feb. 1965, p 142–158. 15 refs. In Russian.

Analysis of the handwriting of cosmonauts during space flight showed that coordination of hand movements during the entire flight varied because of unusual circumstances and disturbances of central nervous system functions. Such a lack of coordination was noted particularly during the initial flight stages. During the remainder of the flight, the handwriting became stabilized but at no time returned to normal. During weightlessness, the character of the handwriting, that is, the joining of letters and pressure on the pen indicated a distortion of normal coordination of the brain centers and afferent branches leading to the motor units. This disturbance could be compensated by producing conditions affecting the stereognostic sense of the subject.

A65-80985
RESPONSE OF THE IRRADIATED ORGANISM TO CRITICAL-VALUE ACCELERATION [REAKTIVNOST' OBLUCHENNOGO ORGANIZMA PRI DEISTVII KRITICHESKOGO PO VELICHINE USKORENIIA].
B. I. Davydov, V. V. Antipov, and P. P. Saksonov.
Kosmicheskie Issledovaniia, vol. 3, Jan.–Feb. 1965, p. 159–166. 19 refs. In Russian.

The extent of acceleration tolerance of an organism after exposure to ionizing radiation was studied in albino mice. After 1-to-7-day exposures to 250, 500 and 700 r doses, the animals tolerated greater accelerations than the controls. The animals that had not been subjected to preliminary irradiation showed greater tolerance to repeated exposure. The preirradiated animals (760 r) did not show the same effects. The authors suggest that in nonirradiated animals the first acceleration experience evokes adaptive activity. Therefore it may be presumed that irradiation suppresses the compensatory response of the neuroendocrine mechanisms regulating the cardiovascular and respiratory systems. This conclusion may be applied to the human organism because in animals the physiological effects of irradiation e.g., the degree of leucopenia are similar to those in humans.

A65-80986
SUPPRESSION OF THE VISUAL NEURONS OF THE CEREBRAL CORTEX BY AN AUDITORY STIMULUS [TORMOZHENIE VYZVANNOI AKTIVNOSTI NEIRONOV ZRITEL'NOI KORY VO VREMIA DEISTVIIA ZVUKOVOGO STIMULA].
V. G. Skrebitskii and L. L. Voronin.
Doklady Akademii Nauk SSSR, vol. 160, Feb. 1, 1965, p. 972–975. 18 refs. In Russian.

Experiments on rabbits showed that 48% of the neurons in the visual cortical centers did not respond to light flickers. Forty-five percent of these neurons responded to an auditory stimulus. During auditory stimulation, the neurons undergo depolarization, which may result in some response to stimulation or in supression of the stimulus, or in an increase of discharges throughout the duration of the stimulus. Suppression was expressed either in absence of response or by a decrease in the number of peaks. The results suggest the existence of direct suppression of discharges in cortical cells caused by an external stimulus. In the visual neurons in which the acoustic stimulus suppressed background activity and stimulated sensory activity, the effect may be direct, or the action may be on the hyperpolarization of the membrane. In cases in which background activity was not affected, the impulses could be blocked at the presynaptic sites. Better knowledge of this mechanism could be gained by the direct intracellular potential measurement and by a detailed structural study of the neurons of the cortex and of the subcortical zones.

A65-80987
MAN'S POSTURE.
J. V. Basmajian (Queen's U., Dept. of Anat., Kingston, Ontario, Canada).
(Scientific Session of the American Academy of Physical Medicine and Rehabilitation, Boston, Aug. 24, 1964).
Archives of Physical Medicine and Rehabilitation, vol. 46, Jan. 1965, p. 26–36. 47 refs.
HEW supported research.

The intrinsic mechanisms which counteract gravitational pull are essential in posture study. Man has the most economical of antigravity mechanisms once the upright posture is attained. Man's antigravity muscles are not so much for maintaining normal standing or sitting posture as for producing the powerful movements necessary for the major changes from lying to sitting or standing. It is wrong to equate those muscles with those of animals which stand on fixed joints. The author bases his findings on electromyographic studies and on observations of muscular and related mechanisms which maintain equilibrium in man for various postures different from the erect one.

A65-80988
MECHANISMS OF SHOULDER MOVEMENT.
Wilfrid T. Dempster (Mich., U., Anat. Dept., Ann Arbor).
(Scientific Session of the American Academy of Physical Medicine and Rehabilitation, Boston, Aug. 24, 1964).
Archives of Physical Medicine and Rehabilitation, vol. 46, Jan. 1965, p. p. 49–70. 19 refs.
Grant PHS GM-07741-04.

The mechanics of movement at the shoulder have been studied using living subjects and ligament preparations of cadaver material, and treating the shoulder as a complex of three distinct joints: the sternoclavicular joint, the claviscapular joint, and the glenohumeral joint. Each joint has been discussed functionally both in terms of its range of movement and the action of associated ligaments in restraining movement. When a joint reaches its limit in any direction, tightened ligaments and a pressure contact between articular surfaces result in a stable force equilibrium. The normal range of motions allowed for the humerus using all three shoulder joints has been compared with the range for the glenohumeral joint alone, and for the composite range of the glenohumeral and claviscapular joints; this showed the significance in added motion permitted by the claviscapular and sternoclavicular joints. A simplifying concept— skeletal links— is employed to clarify the kinematics of shoulder action at each joint; the usual description of the sternoclavicular joint is somewhat expanded; a terminology for motions of the scapula is proposed; and the significance of scapular movements for a functional understanding of shoulder actions is discussed.

A65-80989
NITROGEN AND WEIGHT LOSSES DURING STARVATION AND REALIMENTATION IN OBESITY.
Marian E. Swendseid, Dorothy B. Mulcare, and Ernst J. Drenick (Calif. U., V. A. Center and Schools of Public Health and Med., Los Angeles).
(American Dietetic Association, 47th Annual Meeting, Portland, Oregon, July 29, 1964).
Journal of the American Dietetic Association, vol. 46, Apr. 1965, p. 276–279. 11 refs.
NIH and Nutrition Found., Inc., supported research.

Nitrogen balance studies were carried out with 13 patients weighing from 107.3 to 205.5 kg who were subjected to a starvation regimen for periods as long as 90 days. During the first month, these subjects lost the most nitrogen, and there was a correlation between nitrogen loss and weight loss. In the second month, nitrogen loss decreased to a greater

extent than weight loss. For the third month, the subjects who continued to starve lost approximately the same amount of nitrogen and weight as in the previous month. On the basis of certain assumptions for fluid balance and the water content of various parts of the body, calculations were made for tissue loss, fat loss, and caloric loss for the successive months of starvation. Obese subjects maintained nitrogen equilibrium but continued to lose weight when low-calorie diets were administered after starvation periods of 55 days or longer.

A65-80990
DIFFERENCES IN CARDIAC HYPERTROPHY IN EXERCISE AND IN HYPOXIA.
Edward J. Van Liere, Barbara Baugh Krames, and David W. Northup (W. Va. U. School of Med., Dept. of Physiol., Morgantown).
Circulation Research, vol. 16, Mar. 1965, p. 244-248. 25 refs.

A group of rats, including both sexes, was exercised on an electrically-driven treadmill at the rate of 1 mile per hour for 2 hours daily to a total of 60 hours. Another group, also including both sexes, was exposed to intermittent hypoxia for 8 hours daily, 6 days per week, for 4 weeks at a barometric pressure of 303 mm Hg corresponding to a simulated altitude of approximately 24,000 feet. All animals showed significant hypertrophy of both ventricles. Exercise produced about the same percentage of weight increased in the right and also in the left vertricular walls. The percent increased of the right ventricular wall relative to that of the left ventricular wall was greater after intermittent hypoxia than after exercise. The ratio of left ventricular weight to right ventricular weight was significantly less in the hypoxic group than in the exercised group. This indicates a relative right ventricular hypertrophy produced by the intermittent hypoxia. Reasons are given to indicate that the pulmonary hypertension associated with hypoxia is the cause of this right ventricular predominance.

A65-80991
FATIGUE AND WORK OF THE SKELETAL MUSCLE AFTER PHYSICAL EXERCISE TRAINING IN THE AGED [FATICA E LAVORO DEL MUSCOLO SCHELETRICO NELL'ALLENAMENTO ALL'ESERCIZIO FISICO NEL YECCHIO].
M. Mitolo, D. Ruccia, and V. Cotugno (Bari U., Inst. of Human Physiol., Italy).
Giornale di Gerontologia, vol. 12, Nov. 1964, p. 1313-1320. 6 refs.
In Italian.

Ergographic research shows that optimum performance in physical exercise with dumbells (increase of duration, of 40% to 46%) attained in 2 old subjects (aged 73 and 79 respectively) as a result of daily training (for 32 days), was largely related to increased work capacity of the skeletal muscular system and to delayed muscular fatigue. In the course of training, after some period of tiredness during the first days, muscular performance appeared to be raised after exercise as compared to rest.

A65-80992
DAMAGE RISK CRITERION AND CONTOURS BASED ON PERMANENT AND TEMPORARY HEARING LOSS DATA.
K. D. Kryter (Bolt, Beranek and Newman, Inc., Cambridge, Mass.)
Industrial Hygiene Association Journal, vol. 26, Jan.-Feb. 1965, p. 34-44. 19 refs.
Contract DA-49-193-MD-2235.

A damage risk criterion is proposed that provides more protection for the frequency region of hearing important to speech perception than to other areas. Damage risk contours are drawn to this criterion on the basis of rather detailed temporary threshold shift data obtained in the laboratory. The (TTS_2) temporary threshold shift in 2-minute postexposure found in young adults with normal hearing, from an 8-hour exposure to a noise, has about the same numerical magnitude as the (NIPTS) noise-induced permanent threshold shift in industrial workers exposed for 10 or more years, 8 hours per work day, to about the same noise; it is concluded that (TTS) temporary threshold shift data can be used as a reasonably valid secondary yardstick for assessing the potential damage risk for permanent threshold shifts due to exposure to noise. The damage risk contours proposed represent a degree of calculated risk for persons exposed to the levels, spectra, and daily durations specified. This risk can best be met by lowering the levels specified by 10 dB or so; if this is not practical, a program for monitoring the hearing of noise-exposed workers could be used in order to detect, and remove from the noise, those worker showing significant permanent threshold shifts.

A65-80993
THE MEASUREMENT OF PHENOL IN URINE BY GAS CHROMATOGRAPHY AS A CHECK ON BENZENE EXPOSURE.
A. B. Van Haaften and S. T. Sie (Koninklijke/Shell-Lab., Amsterdam, The Netherlands).
Industrial Hygiene Association Journal, vol. 26, Jan.-Feb. 1965, p. 52-58. 9 refs.

At present the gas chromatographic method is the most specific and, after preparation of the apparatus, also the most rapid method for determining the phenol content of urine. Gibb's method is not much inferior to (GLC) gas chromatographic method analysis, at least with regard to interference by p-cresol, but it is far more time consuming. Theis and Benedict's method would be preferable to Gibb's if it were specific for phenol and if p-cresol were not codetermined. If the correlation line (and the angle of its slope) as suggested by Walkley is correct, the results obtained by (GLC) also indicate that the limit of 200 mg of phenol per liter of urine may be considered medically safe. It is advisable, however, to check the correctness of the correlation line with the aid of the (GLC) method to determine the phenol content of urine.

A65-80994
DEVELOPMENT OF A PERSONAL MONITORING INSTRUMENT FOR NOISE.
Franklin W. Church (Esso Res. and Engr. Co., Med. Res. Div., Linden, N. J.)
(American Industrial Hygiene Association, 25th Annual Meeting, Philadelphia, Pa., April 1964).
Industrial Hygiene Association Journal, vol. 26, Jan.-Feb. 1965, p. 59-63. 10 refs.

A new portable electric device with a mercury-type battery source has been developed, which records the total time a worker is exposed to noise, at or above a selected level. The instrument is small, lightweight, and designed to be worn on a person who moves during work. Performance data are given, as well as a guide for the interpretation of data. The device requires little maintenance, is shockproof within limits and easily calibrated. A number of final design models have been in use.

A65-80995
CARBOHYDRATE METABOLISM IN PEOPLE LIVING IN CHRONIC HYPOXIA.
Rolando Calderon and L. Alberto Llerena (Peru U. de Cienc. Med. y Biol., Inst. de Invest. de la Altura, Lima).
Diabetes, vol. 14, Feb. 1965, p. 100-105. 22 refs.
Grant PHS 08576.

Carbohydrate metabolism was studied in a group of 23 normal men, age 40 to 70 years, born and living at an altitude of 14,900 feet with a barometric pressure of 445.8 mm Hg, an alveolar oxygen tension of 46 mm Hg, arterial oxygen tension of 45.1 mm Hg, and an arterial blood oxygen saturation of 80.1%. For comparison, a group of 32 normal men born and living at sea level was studied. During the intravenous glucose tolerance test a low level of fasting blood glucose in the chronic hypoxia group was confirmed, but only minor differences were found in the net changes of glucose. A slightly greater "K" value was found in the chronic hypoxia group. No difference was found during the intravenous tolbutamide test when the net changes from fasting blood glucose were considered. During the intravenous glucagon test there was a statistically significant lesser hyperglycemic response in the hypoxia group. From these studies it would appear that glucose homeostasis is maintained in the chronic hypoxia group with a lower fasting blood glucose.

A65-80996
SUBLIMAL [SIC] DISCRIMINATION AND THE CONCEPT OF VIGILANCE.
P. E. H. Barratt and Helen C. Beh (New England U., Dept. of Psychol., Armidale, Australia).
Australian Journal of Psychology, vol. 16, Aug. 1964, p. 107-119. 29 refs.

Ten experimental subjects underwent a procedure whereby a subliminal 500 cps tone (CS) was paired with photic stimulation (UGS). The "arousal" reaction of the alpha rhythm of the electroencephalogram was used as evidence of a conditioned response (CR). A subliminal tone of 800 cps and a 6 per sec pulsed subliminal shock were used to test for discrimination. Ten matched control subjects underwent the same procedure as the experimental subjects except that the 500 cps tone was never paired with the photic stimulation. Since experimental subjects gave the CR to the 500 cps subliminal tone only and not to the 2 neutral stimuli and control subjects gave no evidence of a CR, it was concluded that discrimination between subliminal stimuli occurs. The results of the study imply that some selective mechanism operates at a neutral level whereby significant stimuli are attended to and nonsignificant stimuli are not.

A65-80997
TRAINING OF PERIPHERAL VISUAL ACUITY.
Per Saugstad and Ivar Lie (Oslo U., Inst. of Psychol., Norway).
Scandinavian Journal of Psychology, vol. 5, 1964, p. 218-224. 10 refs.
Flymed. Inst. Oslo, Videnskapelige Forskningsfond av 1919 supported research.

An experiment was performed to investigate whether the duration of exposure and the size of the test objects are factors critical for obtaining a training effect in peripheral visual acuity. Contrary to previous results it is shown that considerable improvement may be obtained even under conditions of flash stimulation, provided that the test object used for training is sufficiently small to be just discriminable. The results are interpreted

in terms of shifts in the maximum momentary level of attention from the central to the peripheral area of the visual field.

A65-80998
INCREASE IN CAPILLARIES OF THE CEREBRAL CORTEX OF RAT IN CHRONIC OXYGEN DEFICIENCY [KAPILLARVERMEHRUNG IN DER HIRNRINDE DER RATTE UNTER CHRONISCHEM SAUERSTOFFMANGEL.]
Karl Diemer and Rainer Henn (Universitatskinderklin., Bonn; and Max-Planck-Inst., Deut. Forschungsanstalt fur Psychiat., Munich, Germany).
Naturwissenschaften, vol. 52, 1965, p. 135–136. 6 refs. In German.

Four adult rats were exposed for 60 days in a pressure chamber to pressures ranging from 250 to 300 torr, corresponding to a partial O_2 pressure in the respiratory air of 50 to 60 torr. Five controls were kept at normal pressure. After completion of the exposure the animals were sacrificed, and a capillary count was carried out on anterior parietal brain sections treated according the method of H. C. Wilder (Amer. Jour. Pathol., vol. 11, p. 817, 1935). The chronically anoxic animals showed increase of the number of capillaries averaging 59% of the initial value.

A65-80999
WATER REGULATION IN THE RAT: HEART RATE AS A FUNCTION OF HYDRATION, ANESTHESIA, AND ASSOCIATION WITH REINFORCEMENT.
Lawrence I. O'Kelly, Glenn I. Hatton, Linda Tucker, and D'Anne Westall (Ill. U., Urbana).
Journal of Comparative and Physiological Psychology, vol. 59, Apr. 1965, p. 159–165. 22 refs.
Grant PHS M-4853.

Heart rate of water-deprived rats was recorded before, during, and after they received stomach loads of water or hypertonic sodium chloride through chronically placed nasal tubes. Following an initial acceleration of heart rate consequent to loading per se, (dehydrating hypertonic saline loads produced a slowing of heart rate) and hydrating water loads caused a sustained increase in heart rate. Slowing accompanying dehydration was partially masked, but not eliminated, by anesthetic doses of Nembutal, whereas accelerative response to hydration was only minimally affected. When dehydrated rats were allowed to drink, heart rate immediately accelerated, but failed to do so in response to a habitually used drinking dish which did not contain water on the test occasion.

A65-81000
EFFECTS OF DEPRIVATION AND THERMAL STRESS ON INTAKE OF WATER, SODIUM CHLORIDE, AND SODIUM BICARBONATE IN RATS.
James M. Lipton and Donald J. Mason (Colo. U., Boulder).
Journal of Comparative and Physiological Psychology, vol. 59, Apr. 1965, p. 309–311. 6 refs.

Intake of distilled H_2O and 1% solutions of NaCl and $NaHCO_2$ was studied in 24-hr water-deprived rats and in rats subjected to water deprivation plus a 3-hr period of thermal stress, in a 3-choice 3-hr intake situation. In 24-hr deprived rats $NaHCO_2$ was preferred over NaCl which was, in turn, preferred to H_2O. Following thermal stress the H_2O was preferred over the other solutions, with NaCl intake dropping and $NaHCO_2$ intake showing a slight increase. The results are discussed and interpreted in terms of effects of these drive conditions and these electrolytes on water-electrolyte and acid-base balance.

A65-81001
FREQUENCY DISTRIBUTION SHAPE AND WORK OUTPUT.
Philip B. Applewhite, G. Peter Paulhe, and David A. Thompson (Stanford U., Med. School, Div. of Rehabil. Med., Calif.)
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 407–408. 7 refs.
Grant Vocational Rehabil. Admin. 806 p.

Forty subjects were given a complex psychomotor assembly task under four different speed conditions. It was found the shape of their generated frequency distributions varied with changes in mean output.

A65-81002
TESTS OF THE FUNCTIONS OF PROPRIOCEPTION AND INTERACTION OF SENSES.
C. B. Gibbs and O. Logan (Defence Res. Med. Labs., Toronto, Canada).
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 433–442. 7 refs.

It was hypothesized that the speed and direction of movement are monitored by proprioceptive feedback and that extent is determined by integrating the rate signals in time. Consideration of analogous servomechanisms leads to the following predictions that were tested and confirmed in tests using six female and four male subjects. Input data from vision or proprioception alone or from both senses will produce rapid, primary adjustments of equal accuracy. Terminal accuracy was measured to show that the end-points of most residual errors lie in a limited zone of clear central vision, as required by hypotheses. Various previous estimates alleging gross inaccuracy of proprioceptors are shown to be erroneous and irrelevant.

A65-81003
SOME PRINCIPLES FOR DEVELOPMENT OF NEW MEASURES OF HUMAN CONTINUOUS PERFORMANCE.
Richard G. Lathrop (Chico State Coll., Calif.)
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 453–458. 14 refs.
Contract N6-2269-2066 from Naval Air Develop. Center, Johnsville, Pa.

Four general criteria to guide the development of new measures of human continuous performance were outlined. These criteria were concerned with the new measure's theoretical implications, statistical adequacy, reliability and validity, and relationship to other measures of performance. The application of these four criteria was discussed in relation to a hypothetical measure of performance. Limitations of this approach for current experimental research were outlined.

A65-81004
INTERACTION OF FORM AND EXPOSURE TIME IN THE PERCEPTION OF SLANT.
A. H. Smith (Defence Res. Med. Labs., Toronto, Canada).
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 481–490. 12 refs.

Groups of 24 observers estimated the slant of a circle and a rectangle or a circle and a square by setting a tilt-rod. The forms were viewed at 45° slant, monocularly and binocularly, with fixed head, under reduced conditions. Exposure durations were: for Groups I, II, and IV, 5, 4, 3, 2, and 1 sec, imposed in descending order; and for Group III, five 3-sec exposures. Groups I and III left the tilt-rod at the response setting, and Groups II and IV returned it to vertical, after each response. With reduced exposure, overall estimates of slant decreased for the response setting, but decreased less, or did not change significantly for the vertical setting. The difference between the estimates for the circle and rectangle or square increased with reduced exposure time due mainly to decrement for the angular forms. The discussion relates the overall result to an anchor effect of tilt-rod position, and the trend difference for form to differential salience of projective outline distortion and convergence.

A65-81005
EFFECT OF VARIABLE STIMULUS INTENSITY ON ESTIMATES OF DURATION.
K. Danziger (Cape Town U., South Africa).
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 505–508.

Judgments of the duration of tones increasing or decreasing in intensity over a range of 22 dB were compared with judgments of the duration of tones of constant intensity for stimulus duration of 2, 4, 6, 8, and 12 sec. The duration of tones of varying intensity was significantly underestimated relative to the constant tone at the shorter stimulus lengths. The effect was only observed for tones of increasing intensity at stimulus durations of 8 sec and not at all at stimulus duration of 12 sec. A general inverse relationship between rate of stimulus change and estimated duration is suggested for stimulus changes above a critical rate.

A65-81006
LEARNING AND RETENTION IN THE ESTIMATION OF SHORT TIME INTERVALS: A CIRCUIT AND A STUDY.
Lewis R. Aiken, Jr. (N.C. U., Greensboro).
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 509–517. 5 refs.

An investigation of the temporal course of learning and retention in the estimation of short time intervals is reported. The experimental design consisted of 6 time intervals (1 1/2, 3, 4 1/2, 6, 7 1/2, and 9 sec) in a balanced Latin square in which 6 adult female subjects made 10 prefeedback, 25 feedback, and 15 postfeedback time estimates by terminating a 500 cps stimulus tone when they judged it to have been on for a certain time interval. Feedback consisted of informing the subject if she had responded too soon, too late, or at the correct time. Analysis of the 1800 absolute differences in milliseconds between real and estimated interval gave the following results: (1) During the prefeedback phase, there was a moderate negative relationship between accuracy of time estimation and duration of interval estimated. (2) Accuracy of estimation improved on the trial following the first feedback trial, but little further improvement during the feedback phase was noted. (3) Amount of improvement in accuracy of estimation with feedback had a moderate negative relationship to duration of interval estimated. (4) Accuracy of estimation declined rather rapidly during the postfeedback phase.

A65-81007
EYE-MOVEMENT PATTERNS IN SCANNING NUMERIC DISPLAYS.
John D. Gould and Amy Schaffer (IBM Watson Res. Center, Yorktown Heights, N.Y.)
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 521–535. 16 refs.

Eye movements of three subjects during visual scanning of 15° 21' 6 X 6 numeric matrices were studied, using a modification of the Mackworth eye-maker apparatus, as a function of frequency of target numeral digit scanned for, and learning. The results indicated that time to scan varied significantly with both frequency and target digit, and these time differences were reflected by significant departures from the overall average number of fixations (18), while average duration of fixations (.31 sec)

remained relatively constant. The average durations of fixations on target numbers (.32) and nontarget numbers (.30 sec) were not statistically significantly different. Average center-to-center distance between the closest fixation and a target number was 2° 28′ and this distance differed among digits, being 2° 42′ for the most quickly recognized and 1° 36′ for the most difficult to recognize. The results indicated the possible role of eye movements in information processing.

A65-81008
DEPENDENCE OF OBJECT IDENTIFICATION UPON EDGE AND SURFACE.
Thomas M. Nelson and Paul C. Vasold (Alberta U., Edmonton, Canada).
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 537–546. 10 refs.

The importance of characteristics of edge and surface to object recognition was investigated. Recognition times of 42 male subjects were established for samples of positive and negative prints made from photographs of 20 common items. Results show that identification depends upon the extent to which photic zones and gradients defining the surface maintain their interrelationships. Dependence upon surface increases with the difficulty of identification.

A65-81009
REACTION TIME AS A FUNCTION OF ONSET AND OFFSET STIMULATION OF THE FOVEA AND PERIPHERY.
Victor P. Pease and Thomas G. Sticht (Ariz. U., Tucson).
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 549–554. 10 refs.
Grant NSF GB-1384.

Reaction times were obtained for the onset and offset of luminous stimuli of 31,400 mL, 3.14 mL, and 1.98 mL, presented in the fovea and periphery. It was found that in the periphery offset reaction times are longer than onset reaction times. The opposite is true for the fovea. In both the fovea and periphery the differences between the onset and offset reaction times decreased as the luminance increases.

A65-81010
MOVEMENT AFTEREFFECTS AND FIGURAL AFTEREFFECTS.
Wolfgang Koehler (Dartmouth Coll., Hanover, N.H.)
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 591–592.
Grant NSF B-16631.

Recent work on certain movement aftereffects has shown that the duration of such effects is greater in the lower half of the visual field than it is in the upper half. This finding is said to be opposed to the theory of figural aftereffects developed by Koehler and Wallach. Closer examination of the situation shows that the new facts agree with the theory.

A65-81011
CONDITIONING OF THE HUMAN VESTIBULAR SWAY RESPONSE.
Bow Tong Lett Revusky, John W. Moore, and Ernest Dzendolet (Mass. U., Amherst).
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 593–600. 5 refs.
Grant PHS NB-03675-03.

Fifty-seven human subjects participated in a demonstration of conditioning of the postural sway response elicited by low current sinusoidal electrical stimulation of the vestibular apparatus. In addition to a conditioning group which received paired presentations of a tone conditioned stimulus and vestibular stimulation, there were three control groups: a group which received the conditioned stimulus alone, another which received the unconditioned stimulus alone, and a third which received random unpaired presentations of the conditioned stimulus and unconditioned stimulus. Comparison of vestibular sway within and between these groups indicated that conditioning did occur.

A65-81012
SPECIFIC MOTOR RESPONSE DURING SLEEP TO SLEEP ADMINISTERED MEANINGFUL SUGGESTION: AN EXPLORATORY INVESTIGATION.
Jeremy C. Cobb, Frederick J. Evans, Lawrence A. Gustafson, Donald N. O'Connell, Martin T. Orne, and Ronald E. Shore (Pa. U.; and Inst. of Pa. Hosp., Philadelphia).
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 629–636. 28 refs.
Grant AF-AFOSR-707-65.

Complex meaningful suggestions were given during various stages of physiological sleep as defined by EEG monitoring to four subjects high and four subjects low in hypnotizability. All the high hypnotizability subjects gave accurate behavioral responses while asleep, but none of the low hypnotizability subjects did so. Specific response to sleep-administered suggestion was obtained only during Stage 1 periods.

A65-81013
SOME EARTH LIFE SEEN ADAPTABLE TO MARS.
Roderick D. Hibben.
Aviation Week and Space Technology, vol. 82, Apr. 12, 1965, p. 71–79.

There is evidence that certain plants, insects, and primitive animal organisms found on earth could survive the temperature extremes and low-oxygen environment thought to exist on Mars. There seems to be a direct correlation between the ability of a chemical compound which acts as a plant growth accelerating hormone and the activity outside the living plant of the compound as a chemical antioxidant. The chemistry and development of preexisting life forms on earth and those which might exist on neighboring planets may have been similar. Laboratory tests showed that plants could survive a reduced oxygen atmosphere. However, their chemistry was greatly changed. Under thermal variations which are thought to exist on Mars, the plants had vegetative reproduction, but no floral reproduction was observed. Desert species died but the roots produced young shoots. Meal worm larvae showed a longer period of survival than pupae and adult invertebrates. Red-ear turtles survived but their red-count did not increase, as in the case in humans, and blood volume decreased below effective circulation requirements. In most cases 1% to 5% oxygen was sufficient to support activity of many adult insects. However, because any liquid water present on Mars may have high salinity, many forms of life would be ruled out. Fungi could survive and reproduce in an environment almost devoid of oxygen and water. Some lichens have been found to survive 4000 times the normal ultraviolet radiation received on earth and temperatures of -30° F. Molds and a variety of bacteria are able to grow in pure ammonia or a mixture of ammonia and methane.

A65-81014
USE OF A PIEZO-ACCELEROMETER IN STUDYING EYE DYNAMICS.
J. G. Thomas (U. Coll., Engr. Dept., Cardiff, Great Britain).
Journal of the Optical Society of America, vol. 55, May 1965, p. 534–537. 14 refs.

A small cantilever-type piezoelectric accelerometer has been fixed to a contact lens. By means of one or two electrical integrations of the amplified output voltage, angular acceleration, velocity, or displacement of the moving eye can be measured as functions of time. The sensitivity is high enough to record involuntary saccades and tremor during fixation; the bandwidth of the system under these conditions is 200 cps. The high sensitivity is maintained for all positions of the eye, so that during saccades and other fast eye movements, the fine detail, particularly of the small overshoots, can be examined. For study of the characteristics of the extraocular muscle-eyeball system, sinusoidal or transient eye movements caused by applying vibrational or steplike forces to the eye are recorded. These forces are applied by the action of an electromagnet on a piece of magnetic material fixed to the contact lens. Forced eye movements are also induced by applying either steady vibrations or impulsive forces to the head. Two recording accelerometers are then used, one is on the contact lense, and the second is fixed to a bite bar. Experiments have been made with human subjects and with dogs. Typical recordings are discussed.

A65-81015
TEMPORAL AND SPATIAL VISUAL MASKING. I. MASKING BY IMPULSE FLASHES.
George Sperling (Bell Telephone Labs., Inc., Murray Hill, N.J.)
Journal of the Optical Society of America, vol. 55, May 1965, p. 541–559. 57 refs.

Visual masking depends upon several qualitatively different detection processes; it is a highly nonlinear phenomenon. Masking by impulses was studied, particularly presentations in which test and masking impulse flashes occur simultaneously. In this case, no purely temporal information is available—detection must be of the contrast between test and surround—therefore, threshold is at a maximum. As the information also becomes available, threshold drops, which defines the impulse masking response. The adjusted impulse-contrast threshold C * was found to be fairly independent of background when effects of background and of the masking flash were considered separately. Also, a modified Weber's law (C * 0.1) held approximately. Generally, good predictions of masking response where detection depends on a spatial-contrast judgment. The principle is to consider the first 60 msec of the long flash as an impulse. Presentations which generate negative afterimages tend to cause threshold increases greater than those predicted by theory. Apparent brightness was irrelevant to masking because only masking energy mattered for the type of detection process studied here.

A65-81016
NEGATIVE FLASHES, POSITIVE FLASHES, AND FLICKER EXAMINED BY INCREMENT THRESHOLD TECHNIQUE.
Mitsuo Ikeda and Robert M. Boynton (Rochester U., N. Y.)
Journal of the Optical Society of America, vol. 55, May 1965, p. 560–566. 7 refs.

On and off responses to a conditioning stimulus fluctuating between a primary adapting level of 2.7 ft-L and a secondary level of 0.3 ft-L are investigated using the increment-threshold technique. Single negative conditioning flashes are shown to yield discrete off and then on responses. Positive conditioning flashes, presented after a 17-msec diminution of the primary adapting level and followed by 57 msec at the secondary level, are capable of generating discrete on and off responses, but only if longer than about 40 msec. Very short positive flashes are treated as if they were part of a continuous dark interval. Flicker is investigated by presenting series of N negative conditioning flashes, with N varying from 2 to 5; increment thresholds obtained under these conditions are compared with those for a stimulus

continuously fluctuating between the two levels at 29 cps. The results indicate that the visual system treats the flicker train to a considerable extent as it would a single negative flash, with a ripple superposed that is associated with all individual flashes in the train except the first positive flash, which is always ignored. It is tentatively suggested that the responses to the individual flashes in a flicker train are neither on nor off responses; rather they may be responses to the integrated energy contained within each flash.

A65-81017
COLOR DISCRIMINATION AS A FUNCTION OF EXPOSURE TIME.
Michael H. Siegel (U.S. Army Edgewood Arsenal Chem. Res. and Develop. Labs., Edgewood Arsenal, Md.)
Journal of the Optical Society of America, vol. 55, May 1965, p. 566–568. 12 refs. U.S. Army Edgewood Arsenal Chem. Res. and Develop. Labs. In-House Lab. Independent Res. Program supported research.

An experiment was performed to determine the effect of exposure time on color discrimination. Five durations ranging from 0.02 to 5 sec were used. Discrimination continued to improve as exposure was lengthened. Some possible explanations for these results are offered.

A65-81018
MARS.
Robert S. Richardson and Chesley Bonestell.
New York, Harcourt, Brace and World, Inc., 1964, viii+151 p. $8.50.

If there is extraterrestrial life in the solar system, Mars is the only planet for which we have the slightest evidence. In this book on Mars, there are discussions of the physical characteristics of the planet; probability of life; orbital characteristics and distance from Earth; time measures, seasons, and atmosphere on the planet; vegetative and nonvegetative hypotheses of visible changes; origin of the canals; problems and dangers of habitation; gravitational attraction; and characteristics of the Martian satellites, Phobos and Deimos.

A65-81019
POISONING: DIAGNOSIS AND TREATMENT.
Sven Moeschlin (Burgerspital, Med. Dept., Solothurn, Switzerland).
New York, Grune and Stratton, Inc., 1965, xviii+707 p. refs.
(English translation of: Klinik und Therapie der Vergiftungen - 4th edition. Stuttgart, Georg Thieme Verlag, 1964).

This textbook of diagnosis and treatment of poisonings was written for doctors and medical students, but is useful to all persons interested in treating poisonings due to: inorganic substances and compounds, such as metals (including lead and radioactive substances), metalloids, nitrogen derivatives, sulfur compounds, oxygen, alkalis, and acids; organic poisons such as carbon monoxide, carbon dioxide, alcohols, organic acids, and petroleum distillates; hypnotics; plastic resins; chemical warfare substances; plant poisons; analeptics; antihistamines; anticoagulants; and antibiotics.

A65-81020
ADAPTATION TO PRISMATICALLY ROTATED VISUAL FIELDS.
Ricardo B. Morant and Henry K. Beller (Brandeis U., Dept. of Psychol., Waltham, Mass.)
Science, vol. 148, Apr. 23, 1965, p. 530–531. 9 refs.
Grant NIH M-3658.

The aftereffects of viewing a tilted field of lines differ from the effects of viewing a tilted field of objects. The difference is attributed to the fact that unlike isolated lines, objects have specifiable normal orientations.

A65-81021
NEUROLOGICAL FINDINGS AFTER PROLONGED SLEEP DEPRIVATION.
John J. Ross (U.S. Naval Hosp., Med. Neuropsychiat. Res. Unit, San Diego, Calif.)
(Association for the Psychophysiological Study of Sleep, Palo Alto, Calif., March 1964).
Archives of Neurology, vol. 12, Apr. 1965, p. 399–403. 29 refs. Dept. of Navy supported research.
Grant NSF GB 922.

A case of a 17-year-old male who was sleep-deprived for 264 hours is described, and the previously reported cases of prolonged wakefulness (greater than 120 hours) are briefly reviewed. Psychiatrically, the patient experienced the visual misperceptions, temporal disorientation, cognitive disorganization, and tactual misperceptions that others had experienced, but at the end of the vigil he was psychiatrically much healthier. During the vigil he showed difficulty with focusing his eyes, stereognosis, equilibrium, and speaking. Multiple neurological examinations demonstrated that aside from quite evident physical and mental fatigue, the patient showed no significant abnormalities.

A65-81022
EFFECT OF LOW PO_2 ON QO_2, Na^{22} EFFLUX, AND CONTRACTILITY OF MUSCLES.
William J. Whalen, Priscilla Bosch, and Andrejs Dimants (Iowa State U., Coll. of Med., Dept. of Physiol., Iowa City).
(Federation of American Societies for Experimental Biology, 48th Annual Meeting, Chicago, Ill., April 1964).
American Journal of Physiology, vol. 208, May 1965, p. 855–860. 33 refs.
Grant PHS H5390.

Previous experiments suggested that the in vivo consumption of O_2 by the cell is normally limited by the pO_2 in the cellular experiment. It is suggested that if the pO_2 exceeds a certain minimal level, some or all of the energy from the "extra" respiration may be directly converted to heat. To further test the hypothesis, 39 isolated frog sartorii were placed in respirometers containing Ringer-bicarbonate solution (at 22° or 27° C) equilibrated with gas mixtures of various oxygen tensions. (All gases contained 2% CO_2). The oxygen consumption of muscles exposed to 98% O_2 for 6 to 7 hr reached a stable value which was about 200% of the stable value for muscles exposed to 25% O_2 for the same period of time. In other experiments the depression of the oxygen consumption in 25% O_2 was shown to be reversible. The ability to develop tension, as judged by occasional test contractions, was not impaired in 25% O_2. The amount of lactic acid liberated from the muscles was small and was independent of the pO_2. In additional experiments with similar muscles exposed to either 25% O_2 or 98% N_2 for 5 to 7 hr neither the Na^{22} efflux nor resting membrane potential differed significantly from the values obtained in 98% O_2. The data are consistent with the hypothesis.

A65-81023
CONVERSION OF ACETATE TO LIPIDS AND CO_2 BY LIVER OF RATS EXPOSED TO ACCELERATION STRESS.
D. D. Feller and E. D. Neville (NASA, Ames Res. Center, Environ. Biol. Div., Moffett Field, Calif.)
(Federation of American Societies for Experimental Biology, 48th Annual Meeting, Chicago, Ill., April 1964).
American Journal of Physiology, vol. 208, May 1965, p. 892–895. 10 refs.

Male Sprague-Dawley rats in age groups from 1 to 20 weeks were centrifuged at 4.5 g for periods of 0.5 hr to 14 days. Slices of liver, kidney, and inguinal adipose tissue were incubated with C^{14}-labeled acetate, and the resulting isotopic CO_2 and lipids were measured. When compared with tissues from control rats, liver and adipose tissue from nonfasted centrifuged rats showed increased formation of C^{14}-labled lipids while kidney showed a decrease. Liver from fasted centrifuged rats also showed increased formation of C^{14}-labeled lipids when compared to fasted noncentrifuged controls. The increase in acetate conversion to lipids varied with age of animal and duration of exposure to acceleration. No significant change in acetate-C^{14} oxidation to $C^{14}O_2$ by liver was noted in either fed or fasted centrifuged animals as compared to their corresponding controls. The total lipid content of liver from rats that were exposed to centrifugation was lower than that from control animals.

A65-81024
RESPIRATORY AND BLOOD PRESSURE RESPONSES TO STIMULATION OF PERIPHERAL AFFERENT NERVES.
S. Katz and J. H. Perryman (N.Y. U. Dental Coll., Dept. of Physiol. and Pharmacol., New York City).
American Journal of Physiology, vol. 208, May 1965, p. 993–999. 18 refs.
Grant PHS NB-0134-06.

Experiments on cats anesthetized with pentobarbital sodium indicate that a change in the frequency of peripheral nerve stimulation will alter the direction of the blood pressure and respiratory response only after a certain intensity of stimulation is attained. Low-voltage–high-frequency (1 to 3 volts, 60/sec), high-voltage–low-frequency (15 volts, 10/sec) and low-voltage–low-frequency stimulation of the tibial and/or peroneal nerves initially produces a decrease in blood pressure (20 to 50 mm Hg) and a decrease in respiratory minute volume (13% to 92%). However, high-voltage–high-frequency stimulation generally produces an increase in blood pressure of 10 to 65 mm Hg and an 8% to 14% increase in minute volume. In decerebrate cats, low-voltage–high-frequency as well as high-voltage–high-frequency stimulation of the tibial nerve results in an increase in blood pressure, minute volume, and/or rate and amplitude of phrenic nerve discharge. Frequency and intensity are therefore interrelated. Anatomical specificity of limb peripheral nerve fibers into pressor and depressor afferents is not substantiated.

A65-81025
EFFECTS OF HYPOTHERMIA ON DISAPPEARANCE OF ETHANOL FROM ARTERIAL BLOOD.
D. C. MacGregor, E. Schonbaum, and W. G. Bigelow (Toronto U., Banting Inst., Dept. of Cardiovascular Surg., Ontario, Canada).
(American Physiological Society, Meeting, Providence, R.I., September 1964).
American Journal of Physiology, vol. 208, May 1965, p. 1016–1020. 18 refs. Ontario Heart Found. and McLean Found. supported research.
Grant DRB-9325-10.

Normothermic and hypothermic (24° C) dogs were given ethanol intravenously and the rates of accumulation and disappearance of ethanol from

arterial blood were studied, with the following results: (1) the rate of decrease of ethanol concentration in the arterial blood in normo- and hypothermic dogs was similar, (2) extrapolation of concentration vs. time curves after equilibration showed reduction in apparent total available body-water space in hypothermic dogs. (3) equilibration took twice as long in hypothermic as in normothermic dogs, (4) fourfold increase of tidal volume did not affect the disappearance of ethanol in a normothermic dog, and (5) the disappearance rate of ethanol in hypothermic dogs was decreased by hexamethonium or a small dose of epinephrine, but normalized by a pressor dose of epinephrine. It is suggested that the effects of hypothermia on hepatic blood flow and on alcohol dehydrogenase activity tend to cancel each other out. Modification of the rate of alcohol disappearance by hexamethonium and by epinephrine probably results from changes in hepatic circulation.

A65-81026
EFFECT OF HYPOXIA ON SECRETION OF ACTH IN THE RAT.
B. H. Marks, A. N. Bhattacharya, and Joan Vernikos-Danellis (Ohio State U. Coll. of Med., Dept. of Pharmacol., Columbus).
American Journal of Physiology, vol. 208, May 1965, p. 1021–1025. 19 refs. Grant NIH AM-05110.

Body weights, organ weights, and blood and pituitary ACTH concentrations were determined in rats exposed continuously to 20.9%, 15.0%, or 10.0% O_2 atmospheres at normal barometric pressure for periods ranging from 3 to 120 hr. Hypoxia resulted in some loss of body weight, and loss of weight of the thymus and the ovary. The weight of the adrenals increased. Blood ACTH rose rapidly after exposure to hypoxic conditions, remaining elevated for the duration of the experiment. Control animals (20.9% O_2) placed in the same chamber had detectable blood ACTH only at the 3-hr sampling time. Pituitary ACTH also rose rapidly during hypoxia, the elevation being greatest with the most severe hypoxic state. The rate of ACTH synthesis and secretion in the resting state and during the stress of hypoxia is discussed.

A65-81027
CARBON DIOXIDE AND OBSTRUCTED CEREBRAL BLOOD FLOW: CORRELATION BETWEEN CEREBRAL BLOOD FLOW, CROSSFILING, AND NEUROLOGICAL FINDINGS.
Stephen A. Hegedus (VA Hosp., Surg. Res. Lab., Perry Point, Md.) and Richard T. Shackelford (Johns Hopkins Med. School, Dept. of Surg., Baltimore, Md.)
(American Medical Association, 113th Annual Convention, San Francisco, June 25, 1964).
JAMA, vol. 191, Jan. 25, 1965, p. 279–282. 16 refs.

The effect of carbon dioxide on cerebral blood flow was studied in 10 patients with unilateral internal carotid obstruction. Inhalation of 5% carbon dioxide increased the cerebral blood flow significantly from 28.8 to 40.5 ml/100 gm of brain weight per minute (a 40% increase). A significant correlation was established between cerebral blood flow, neurological defects, and angiographic crossfiling. Increased cerebrovascular resistance in carotid obstruction is attributed to increased cerebrovascular tonus, which tends to preserve pressure gradients all along the cerebral arterial tree in the presence of a decreased volume of inflow. Carbon dioxide inhalation increased the cerebral blood flow by virtue of reduction of this cerebrovascular resistance, thereby serving to reduce stasis in less efficiently perfused arteries. Intermittent inhalation of 5% carbon dioxide in air is recommended as an adjunct to vascular surgery in treatment of unilateral carotid obstructions.

A65-81028
THE FIRST ARTIFICIAL SATELLITE WITH A THREE-MAN CREW [DER ERSTE KUNSTLICHE ERDSATELLIT MIT DREIKOPFIGER BESATZUNG].
Umschau, vol. 65, Feb. 1, 1965, p. 79. In German.

The orbital flight of Voskhod with its three-man crew is highlighted. Of interest is the fact that space suits were not worn aboard. The astronauts were clad in light woolen clothing instead. The presence of a flight surgeon with a specialty in vestibular physiology allowed extensive observations of the human organism in weightlessness and interindividual comparisons. Careful self-observation in weightlessness with eyes closed gave rise to impressions that one's body is floating in a face-down position.

A65-81029
RADIOPROTECTIVE ACTION OF CYSTEAMINE AND CYSTAMINE IN MICE AS FUNCTION OF THE TIME SEPARATING THE INJECTION OF THE PROTECTIVE AGENT AND BEFORE IRRADIATION BY X-RAYS [ACTION RADIOPROTECTRICE DE LA CYSTEAMINE ET DE LA CYSTAMINE CHEZ LA SOURIS EN FONCTION DUTEMPS SEPARANT L'INJECTION DU PROTECTEUR DU DEBUT DE L'IRRADIATION PAR RAYONS X].
Z. M. Bacq and M. L. Beaumariage (Liege U., Lab. de Pathol. Gen., Belgium).
(Societe Belge de Physiologie et de Pharmacologie, Meeting, Louvain, Belgium, Oct. 17, 1964.)
Archives Internationales de Pharmacodynamie et de Therapie, vol. 153, Feb. 1965, p. 457–459. 6 refs. In French.

C57 mice of both sexes received saline solution (controls), or intraperitoneal injection of cysteamine or cystamine. The mice were exposed to total X-irradiation (900 roentgens, 235 roentgens/minute) 10, 25, 45, or 60 minutes after injections. Controls were irradiated at the same time as animals injected with radioprotectors. All control animals died between the fourth or fifth day after irradiation. Animals injected with cysteamine or cystamine survived an average of 6.7 to 17.2 days. Radioprotection was best when the substances were injected 10 minutes before irradiation. Cysteamine was more effective than cystamine. A table showing survival data is included.

A65-81030
THEORETICAL AND ANALOGICAL STUDY OF THE COMPOSITION OF ALVEOLAR GAS IN PERIODIC OPERATION. APPLICATION TO PROBLEM OF CHEMICAL REGULATION OF RESPIRATION [ETUDE THEORIQUE ET ANALOGIQUE DE LA COMPOSITION DU GAZ ALVEOLAIRE EN REGIME PERIODIQUE. APPLICATION AU PROBLEME DE LA REGULATION CHIMIQUE DE LA RESPIRATION].
Emile Florentin (Fac. de Med., Lab. de Physiol., Paris, France).
Journal de Physiologie, vol. 56, (Supplement 9), 1964, 60 p. 11 refs. In French.

This experiment was performed in the following four stages: (1) an experimental study of the periodic variations of alveolar carbon dioxide partial pressure (PA_{CO_2}); (2) theoretical study of alveolar gas in variable regime and determination of PA_{CO_2}; (3) mathematical study of the PA_{CO_2}, equation in a periodic regime with numerical resolution approached by the Fourier series; and (4) a valid analogical resolution of the PA_{CO_2} equation in a periodic regime. The results furnished by analogical calculation presented a remarkable similarity with those obtained by the mathematical method. The experiments demonstrated that: (a) the disturbance of PA_{CO_2}, induced by gas inhalation where the carbon dioxide concentration varied in a sinusoidal manner, was followed by a periodic ventilatory change; (b) the mean value of PA_{CO2} varied slightly around its initial value, i.e., for a variation of PI_{CO_2} of 8 mm Hg, the variation of PA_{CO_2} was 1.6 mm Hg; (c) spontaneous fluctuations of PA_{CO_2} were of the same high order in all subjects at rest; and (d) ventilation slowed the PA_{CO_2} phase about 120°, which itself slowed the PI_{CO_2} phase by about 50°. It is concluded that PA_{CO_2} intervenes in the chemical regulation of respiration at rest.

A65-81031
REPRODUCTION AND ESTIMATION METHODS OF TIME JUDGMENT.
Frank M. Ochberg, Irwin W. Pollack, and Eugene Meyer (Johns Hopkins Hosp., Baltimore, Md.)
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 653–656. 10 refs.

Two methods of time judgment, the method of reproduction and the method of estimation, were compared. Subjects were women blindfolded after ocular surgery, women not blindfolded after ocular surgery, and visually normal female employees of the hospital. The reproduction task was handled equally well by all groups, and time estimates were given with greater accuracy and reproducibility than for the estimation task. On the other hand, the method of estimation led to differential performance among groups, with greater accuracy and least variance in the working group, and least accuracy with greatest variance in the blindfolded group.

A65-81032
INTRODUCTION TO BIOMECHANICS.
Herbert R. Lissner (Wayne State U., Colls. of Engr. and Med., Detroit, Mich.)
(Scientific Sessions of the American Academy of Physical Medicine and Rehabilitation, Boston, Aug. 24, 1964).
Archives of Physical Medicine and Rehabilitation, vol. 46, Jan. 1965, p. 2–9. HEW supported research.

Four areas of knowledge are basically involved in biomechanics: statics, dynamics, fluid mechanisms, and mechanics of materials. In the vast number of problems with which biomechanics is concerned, two methods of solution are available, analytic and experimental; generally the two are combined. One experimental method of solution of problems makes use of transducers which generally depend on electronics for their operation. Considerable information must be obtained experimentally to substitute in the equations of the analytic method in order to be able to obtain numerical solutions. In the same way that the analytic method is dependent on use of numerical values obtained experimentally, the experimental method is dependent on some mathematical analysis to obtain the desired results. A knowledge of the fundamentals of biomechanics is most important in understanding the physical behavior of the body, and the application of this knowledge to pertinent biologic problems is providing valuable information that could not be obtained elsewhere.

A65-81033
ANTIRADIATION COMPOUNDS VII. LONG-CHAIN ALKYL DERIVATIVES OF 2-MERCAPTOETHYLGUANIDINE.
William O. Foye, Edward F. LaSala (Mass. Coll. of Pharm., Dept. of Chem., Boston), Minas Georgiadis, and Walter L. Meyer (Ind. U., Dept. of Chem., Bloomington).
(American Pharmaceutical Association, Meeting, New York City, August 1964).

Journal of Pharmaceutical Sciences, vol. 54, Apr. 1965, p. 557–560. 14 refs.
Contract DA-49-193-MD-2029; and Grant PHS RH-00297,

Mono-N-alkyl and N,N'-dialkyl derivatives of 2-mercaptoethylguanidine (MEG) were synthesized as potential radioprotective agents with the assumption that increase in liposolubility of MEG will improve its radioprotective ability. The compounds were obtained by reaction of bromoethylamine with the appropriate alkylated thiourea to give the corresponding aminoethylisothiouronium bromide hydrobromide, which was rearranged to the desired MEG derivative in alkaline solution. The alkyl MEG hydrobromides, unlike MEG-HBr itself, could be isolated from aqueous solution. Conversion to the trithiocarbonates generally gave products of better crystalline properties. The structure of the trithiocarbonate of MEG was supported by nuclear magnetic resonance analysis. Tests were carried out with two MEG derivatives, N-myristyl-2-mercaptoethylguanidine trithiocarbonate, in doses of 50 mg/mg or less on mice exposed to lethal doses of X-radiation. Neither compound was protective.

A65-81034
METHYLENE BLUE IN THE TREATMENT OF DECABORANE TOXICITY.
John A. Merritt, Jr.
Archives of Environmental Health, vol. 10, Mar. 1965, p. 452–454. 16 refs.

Adult rabbits continuously infused intravenously with 5% dextrose were given 30 mg per kg of decarborane dissolved in 4 ml of corn oil intraperitoneally. After 20 minutes methylene blue (7 mg per kg) was given in 5% dextrose over a 60-minute period followed by an infusion of dilute methylene blue for 47 hours. All of the animals treated with methylene blue as described above lived longer than 24 hours and half lived longer than 48 hours. All of the untreated rabbits died in less than 24 hours. Since the high energy fuel decarborane is a potent reducing agent, it seems likely that the oxidizing capacity of methylene blue accounts for its effect. It is suggested that this form of therapy would be more useful than previous empirical treatment of boron hydride toxicity.

A65-81035
PROTECTION AGAINST HEAT OF MECHANICS IN THE NAVY [PROTECTION CONTRE LA CHALEUR DU PERSONNEL MECANICIEN DANS LA MARINE NATIONALE].
Broussolle, P. Faltot, and A. Bernardini.
Revue des Corps de Sante des Armees Terre Mer Air, vol. 6, Feb. 1965, p. 37–49. In French.

In the French Navy, mechanics are exposed to hot environments under two situations: (1) the zero phase on the vessel, i.e., when a ship crosses an atomic cloud all windows are closed to outside ventilation thereby raising the temperature of boilers and machines; and (2) submarine navigation in a warm sea. Solutions are proposed to reduce the heat by either cooling the entire machine area or by cooling the cabins where personnel are grouped. Individual protection is considered using four suits of two different types. Suits which use fresh air ventilation in an open circuit are the following: (a) C.E.P.S.M. prototype suit, (b) REMCO prototype suit with swirling tube, (c) CO.MA.SEC type F suit, and (d) Frigivest suit using open circuit ventilation air trapped under the garment and passing over a cold source. These suits are described and compared from the physiological and practical points of view in climatic chamber tests and aboard submarines. The results indicate that the protection given by the suits is not perfect. Under experimental chamber test conditions the C.E.P.S.M. and CO.MA.SEC suits provided the best protection.

A65-81036
MILITARY IMPLICATIONS OF STUDIES CONCERNING VIGILANCE AND DECISION-MAKING [IMPLICATIONS MILITAIRES DES RECHERCHES CONCERNANT LA VIGILANCE ET LA PRISE DE DECISION].
Caille.
Revue des Corps de Sante des Armees Terre Mer Air, vol. Feb. 1965, p. 63–92. 71 refs. In French.

It is considered that the level of vigilance is regulated by cortical reticular activity. The problems of vigilance and decision-making are discussed from psychological and neurophysiological viewpoints. The phases and mechanisms of vigilance, the role of sensory afferences, the role of the cortex in reticular homeostasis, controls of hypervigilance, and the problem of critical reactivity and efficiency are defined. A review is presented of the empirical criteria of vigilance and their explicative schemes including the following: general criteria of an ergonomic order (detection threshold, errors of detection, latency time, etc.); secondary criteria depending on the task structure (sensory modality, task complexity, duration of signal, etc.); tertiary external criteria (individual differences, motivation, sleep, toxic and pharmacological agents, hypotheses, etc.); psychophysiology of vigilance; and methodology of an experimental synthetic approach to detection problems.

A65-81037
PROBLEMS CONNECTED WITH FLYING AIRCRAFT OF VERTICAL TAKE-OFF [PROBLEMES LIES AU PILOTAGE DES AVIONS A DECOLLAGE VERTICAL].
Seris and Auffret.
Revue des Corps de Sante des Armees Terre Mer Air, vol. 6, Feb. 1965, p. 103–108. In French.

The main problem associated with flying vertical take off aircraft is that the pilot finds it extremely difficult to coordinate information furnished by outside visibility, calculators, servocontrols, and instruments while keeping track of flying, navigation and the mission, because of the complex instrument panel. The aircraft is controlled by automatic pilot responding to radar information, altimetric radio soundings and navigational servomechanisms. However, it is the pilot who must program and carry out the orders. On the other hand during the task of surveillance he is subjected to many stresses encountered in high altitude flight; heat due to temperature impact, accelerations, and vibrations due to turbulances. In case of accident, saving the pilot poses difficult problems. Briefly described is the instrument panel.

A65-81038
ENVIRONMENTAL STRESS FACTORS OF LIFE IN A CLOSED SPACE IN A SPACE CAPSULE: PROBLEMS POSED BY CONTROL OF THE ARTIFICIAL ATMOSPHERE [LES FACTEURS AGRESSIFS D'ENVIRONNEMENT DE LA VIE EN ESPACE CLOS DANS UN VEHICULE SPATIAL: LES PROBLEMES POSES PAR LE CONTROLE DEL'ATMOSPHERE ARTIFICIELLE].
Colin (Centre d'Essais en Vol, Lab. de Med. Aerospatiale, Bretigny-sur-Orge, France).
Revue des Corps de Sante des Armees Terre Mer Air, vol. 6, Feb. 1965, p. 129–138. In French.

Environmental control of a space vehicle poses complex problems associated with weightlessness, available energy, weight, and congestion and safety of equipment. The following systems necessary for atmospheric control of a closed system are reviewed and diagrammed: oxygen and nitrogen supply; elimination of carbon dioxide; elimination of odors, toxic gases, dirt and debris; hygrometric control; and temperature control. Some solutions are possible for flights not exceeding 10 to 15 days utilizing regenerative chemical or physiochemical systems. For longer trips, biological (photosynthetic) systems may be considered.

A65-81039
ENVIRONMENTAL STRESS FACTORS OF THE CLOSED SPACE IN A NUCLEAR SUBMARINE [LES FACTEURS AGRESSIFS D'ENVIRONNEMENT DE LA VIE EN ESPACE CLOS DANS UN SOUS-MARIN NUCLEAIRE].
Badre and Guillerm (Commission d'Etudes Prat. des Sous-marins, Lab., Toulon, France).
Revue des Corps de Sante des Armees Terre Mer Air, vol. 6, Feb. 1965, p. 145–152. In French.

The environmental stress factors of a nuclear submarine are of a physical (temperature, hygrometry, atmospheric ions) or chemical nature (metabolic gases and pollutants). For temperate climates (sea water between 10° to 25° C) the effective optimal submarine temperature is fixed at 20° C; for tropical climates (sea water 30° C) the temperature never exceeds 28° C; and for cold climates (sea water 2° C) the temperature never is lower than 20° C. Radiators and air conditioning systems automatically regulate temperature and water vapor. Atmospheric ions (mono- or polyatomic molecules) appear to have a minor influence on submarine personnel and their systematic elimination does not seem necessary. With reference to metabolic gases carbon dioxide atmospheric concentration is maintained at less than 2%, and the oxygen concentration between 20% to 22%. Hydrogen, although without physiological action, presents the risk of explosion when eliminated at the same time as carbon monoxide. Carbon monoxide is one of the most significant air pollutants and is usually a byproduct of cooking and cigarette smoking. It is estimated that 25 parts per million is the maximum limit value of carbon monoxide for nuclear submarines. Included is a chromatogram of the submarine atmosphere listing various pollutants.

A65-81040
SENSORY DEPRIVATION AND COGNITIVE DISORDER.
James Inglis (Queen's U., Dept. of Psychiat., Kingston, Ontario, Canada).
British Journal of Psychiatry, vol. 111, Apr. 1965, p. 309–315. 31 refs.
Found. Fund for Res. in Psychiat. supported research.

It seems to be possible to put forward a much simplified model of perceptual and cognitive functioning based on Hebb's original "neuropsychological" model (The Organization of Behavior, New York, Wiley, 1949), which accounts for data on the effects of sensory deprivation at least as well as the perhaps more fashionable hypotheses about the ascending reticular activating system or the ego. It is claimed that this hypothesis also generates further testable expectations and unites the experimental phenomena with some important problems in psychiatry and abnormal psychology.

A65-81041
SECONDARY SELECTION IN NAVAL AVIATION TRAINING.
James R. Berkshire, Robert J. Wherry, Jr., and Richard W. Shoenberger (U.S. Naval School of Aviation Med., Pensacola, Fla.)
Educational and Psychological Measurement, vol. 25, Spring 1965, p. 191–198.

One of the most important tasks in an aviation training program is that of deciding whether a student who is in difficulty should be dropped or given another chance. It seems reasonable to believe that, if all of a student's valid past performance measures could be appropriately weighted and combined into a single statement of the probability of his success or failure, administrative decisions might become more accurate. Probability statements were computed from the selection and training records of all men who entered naval aviation training during 1959. Slightly more useful (and more stable) predictions were obtained from a completed-incompleted dichotomy, rather than that of completion-failure criteria.

A65-81042
EFFECT OF LUMINANCE, EXPOSURE DURATION, AND TASK COMPLEXITY ON REACTION TIME.
Jaques Kasnan and Stephen Young (Calif. U., Los Angeles).
Journal of Experimental Psychology, vol. 69, Apr. 1965, p. 393–400. 8 refs.
Grant NSF G-9598.

Reaction time to a pattern-discrimination task was found to be about equally affected by variation in exposure duration (4 to 512 msec) and luminance (.09 to 11.84 mlm). In a supplementary study of figure-ground detection, it was found that luminance affected reaction time to a greater extent than exposure duration. Further, it was found that luminance and exposure duration determined different reaction time functions in the two experiments. In the discrimination task there was a gradual shift in the relation of luminance and exposure duration to reaction time, from inverse at bright and long exposures, to direct at dim and brief exposures. In the detection task, reaction time was always inversely related to changes in luminance and exposure duration, to the extent to which reaction time was affected by these variables.

A65-81043
SIGNAL UNCERTAINTY AND SLEEP LOSS.
Harold L. Williams, Ometta F. Kearney, and Ardie Lubin (Walter Reed Army Inst. of Res., Washington, D. C.)
Journal of Experimental Psychology, vol. 69, Apr. 1965, p 401–407. 18 refs.

During a 3 to 5 day baseline period, 2 days of sleep loss, and 3 days of recovery, 52 subjects performed 3 visual vigilance tasks, of 10 min each, ranging in signal uncertainty from complete redundancy to .84 bit per second. The major effect of uncertainty was to cause errors of omission which increased with sleep loss. The interaction between signal uncertainty and sleep loss was significant. Task duration (10 min) caused no impairment during the baseline and recovery phases, but during sleep loss, errors of omission rose sharply on the last 3 min of each task. There was no significant interaction between signal uncertainty and task duration. Decrement was considerably greater for subjects working alone than for subjects working in a group. Oral temperatures had no consistent relation to errors of omission or to sleep loss.

A65-81044
EFFERENT INNERVATION OF VESTIBULAR LABYRINTH.
Yasuya Nomura, Richard R. Gacek, and Karoly Balogh, Jr. (Harvard Med. School; and Mass. Gen. Hosp., Boston).
Archives of Otolaryngology, vol. 81, Apr. 1965, p. 335–339. 12 refs.
Grant PHS NB-04155-3.

Acetylcholinesterase activity was demonstrated histochemically in the efferent vestibular fibers and in the vestibular sensory epithelium of decalcified bones of guinea pigs. The fibers were traced from their position within the vestibular trunk, past the vestibular ganglion, and finally in the nerve branches to the end organs. These results confirmed those obtained earlier by experimental neuroanatomatical techniques on the course of the efferent vestibular fiber system. With the present technique, however, many more efferent fibers were revealed in all branches of the vestibular nerve than previously estimated.

A65-81045
CUPULOMETRY AS AN INVESTIGATIVE TOOL.
John F. Daly and Noel L. Cohen (N.Y.U. Med. School, Dept. of Otolaryngol., New York).
Archives of Otolaryngology, vol. 81, Apr. 1965, p. 340–346. 11 refs.
Grant PHS NB-01833.

The effect of the drug cinnarizine, an antihistamine structurally related to meclizine, on the human labyrinthine function was studied in 23 normal subjects by means of a double-blind technique. The stimuli used were those of cupulometry, and the reactions were recorded by means of electronystagmography. The three parameters of response were the duration of the sensation of after-rotation, the duration of postrotatory nystagmus, and the maximum slow phase velocity of the nystagmus. Using these techniques, a 75 mg dose of cinnarizine was found to exert a statistically significant suppressive effect on the duration of both postrotatory nystagmus and the sensation of after-rotation. Irregularities of the velocity of the postrotatory nystagmus precluded its use as the third parameter. This is briefly discussed. Both cinnarizine and the placebo gave rise to an approximately equal number of mild side effects.

A65-81046
SIMPLIFICATION OF CLINICAL CALORIC TEST.
Leslie Bernstein (Iowa U., U. Hosp., Iowa City).
Archives of Otolaryngology, vol. 81, Apr. 1965, p 347-349. 6 refs.

The development of the clinical caloric test as a valuable otological and neurological aid is reviewed briefly. The Fitzgerald-Hallpike technique is described together with a tabulation of its diagnostic results. A modified version of this test is presented in which the warm-water caloric test is performed first. If the resultant after-nystagmus is close to two minutes, and if both ears give a similar response, the test is considered normal, and the cold water stimulus is not carried out. In addition, the period of irrigation was cut down from 40 seconds to 30 seconds with very little difference in the duration of the after-nystagmus; the latter has been confirmed by electronystagmographic recordings. By performing the test in this manner, the time needed to perform the caloric test in patients with normal responses has been reduced from 25 minutes to less than 10 minutes.

A65-81047
PRINCIPLES OF RADIATION PROTECTION.
G. Eaves (Leeds U., Dept. of Cancer Res., Great Britain).
London, Great Britain, Iliffe Books Ltd., 1964, 10+185 p. refs.
$8.25

This book is intended mainly for those who wish or need to know something about radiation protection in a general way, or as an introduction to the more advanced texts quoted in the bibliography. The chapters deal with: the interaction of radiation with matter, damage to biological systems, units of radiation dose, detection and measurement, hazards, maximum permissible levels, radiation protection methods, remote handling and shielding, containment, transportation of radioactive material, disposal of radioactive waste, legislation, emergency procedures, reactor hazards, and design and planning for radiation protection.

A65-81049
PHOTO-ELECTRO-NYSTAGMOGRAPHY (P.E.N.G.) AND PHOTO-ELECTRO-OCULOGRAPHY.
Hs. R. Richter (Basle U., EEG-Dept. of the Neurol. Clin., Switzerland).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2.
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings).

In the clinical investigation of the vestibular system, a highly sensitive and artifact-free photoelectric method can be used for recording eye movements by use of diffuse reflection of an infrared beam, which is centered on the iris and enables an increase in input energy for small eye movements. It permits nystagmographic recordings of liminary reactions to rotary, thermic, and galvanic stimuli. Used with a dc-amplifier, direct scopograms can be taken in oculography reading tests.

A65-81050
THREE-DIMENSIONAL RECORDING OF ROTATIONAL EYE MOVEMENTS BY A NEW CONTACT-LENS TECHNIQUE.
Leonard Matin and Douglas Grant Pearce (Johns Hopkins U., Dept. of Psychol., Baltimore, Md.)
IN BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings).
Edited by William E. Murry and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 79–95.
(See A65-81048)
Grants NSF G-18120 and NSF GB-944.

A system is described for measuring eye movements by recording photoelectrically from two plane mirrors embedded in a scleral contact lens mounted on a subject's eye. Analog solution by on-line electronic analysis of 3 simultaneous algebraic equations yields 3 orthogonal components of ocular rotation (e.g., horizontal, vertical, torsional) with resolution of 2 seconds of arc and frequency response flat within 5% from dc to 1350 cps. Use of infrared measuring beams permits recording in total darkness.

A65-81051
DESIGN AND IMPLANTATION OF SENSORS AND TRANSDUCERS FOR PHYSIOLOGICAL MEASUREMENTS IN WILD BIRDS.
R. D. Thompson (Bur. of Sport Fisheries and Wildlife, Wildlife Res. Center, Denver, Colorado).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2.
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings).
Edited by William E. Murry and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 123–130.
(See A65-81048).

Physiological measurements in wild birds (Sturnus vulgaris and Quiscalus quiscula) were made by implanting the electroencephalogram and

electrocardiogram sensors, and the respiration and temperature transducers, for telemetric recording of the respective functions. The electroencephalogram sensors were implanted intracranially with the electrode balls touching the dura mater. The electrocardiogram sensors were implanted over the dorsal region of the first and second ribs on each side of the thorax. The respiration transducer was attached to the musculature covering of the dorsal and ventral joints of the fourth and fifth thoracic ribs. The temperature transducer was wedged intrathoracically to the fourth rib. Preliminary results showed that implantation sites were satisfactory for recording data free from artifacts when the bird was kept in a laboratory cage.

A65-81052
COCHLEAR MICROPHONICS MEASUREMENTS IN EXPERIMENTAL ANIMALS AND IN MAN.
B. A. Ducote and D. M. Martinez (V. A. Hosp., Southwestern Med. School, Lab. of Inner Ear Physiol., Dallas, Tex.)
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2.
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964 Proceedings).
Edited by William E. Murry and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 131–143. 9 refs.
NIH supported research.
(See A65-81048).

Cochlear microphonic measurements were carried out on experimental animals and man. The electrical activity of the cochlea was measured by cochlear microphonics, endolymphatic potentials, action potentials, and summation potentials. Acute and chronic experiments were carried out in animals by placing or implanting electrodes on the round window of the membrane. In man, such measurements can be made on patients undergoing ear surgery.

A65-81053
INDIRECT BLOOD PRESSURE MONITORING.
T. F. Wichmann (Tasker Instrument Co., Nan Nuys, Calif.) and P. F. Salisbury (St. Joseph Hosp., Burbank, Calif.).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2.
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings).
Edited by William E. Murry and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 185–194.
(See A65-81048).

An indirect blood pressure monitoring system is discussed, which provides continuous monitoring in patients for whom intense care is indicated. This can be accomplished by measuring the propagation velocity of applied pulses in arteries. A theory of operation and ways of implementing a practical system are discussed. Graphic results obtained during experiments are presented which show the time delay of an applied pulse varying at a receiver (oscilloscope) with the natural pressure variations.

A65-81054
THE ARTIFACT PROBLEM IN TELEMETRY OF PHYSIOLOGICAL VARIABLES.
A. F. Ax, L. Andreski, R. Courter, C. DiGiovanni, S. Herman, D. Lucas, and W. Orrick (Lafayette Clin., Detroit, Mich.)
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2.
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings).
Edited by William E. Murry and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 229–233. 6 refs. (See A65-81048).
Contract AF 33(657)-9352.

Multiple recording of physiological variables, especially those telemetered creates a critical need for high-speed computer analysis. Such analysis is prevented by the lack of adequate automatic editing procedures for separation of signal from noise. The noise or "artifact problem" is made more critical by free-roaming subjects. The problem is documented by a study of telemetered respiration. Solutions of the editing problem described include "pattern recognition" by analog circuitry rather than by digital computer so as to cut processing costs.

A65-81055
THE PROBLEM OF ELECTRODES FOR USE WITH ELECTROCARDIOGRAPH RADIO CAPSULES.
G. Edgar Folk, Jr. (Iowa State U., Dept. of Physiol., Iowa City).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2.
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings).
Edited by William E. Murry and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 235–265.
NSF supported research.

A radio capsule implanted in the abdominal cavity can be used for recording the electrocardiogram of mammals. Such capsules transmit the heart rates and record the daily rhythm of sleep and wakefulness of large excitable animals. When these capsules are used, the animals can be studied in an undisturbed and unrestrained state. The discussion emphasizes: (1) the design of appropriate electrodes for radio capsules; (2) the placement of electrodes; and (3) the explanation of several artifacts seen in the records obtained.

A65-81056
PROGRESS IN TELEMETERING MUSCLE POTENTIALS.
Wen H. Ko (Case Inst. of Technol., Cleveland, Ohio).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2.
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings).
Edited by William E. Murry and Peter F. Salisbury. New York, Plenum Press, 1964, p. 267–273.
Case Inst. of Technol. and Vocational Rehabil. Admin. supported research.
(See A65-81048).

Radio transmission of physiological signals from normal living subjects with implanted electronic transmitters has well recognized advantages over wire transmission of the same signals. The major difficulties in the design and operation of radio transmission implant devices are: (1) the quality of the signal transmitted; and (2) the power supply and useful life of the implant device. This article reports on the performance of radio transducers (transmitter and the electrodes) designed and fabricated at Case Institute of Technology and on the field evaluation of this equipment. Twenty-two implant operations in rabbits to transmit electromyograms (EMG) from the leg muscle were made with satisfactory results. The radio powering of implanted transducers for the transmission of EMG from rabbits, and electrocardiograms and respiration from rats were successfully obtained for a period of 15 days.

A65-81057
A PROGRESS REPORT ON RADIO TELEMETRY FROM INSIDE THE BODY.
R. Stuart Mackay (Calif. U., Space Sci., Lab. and Med. Phys. Div., Berkeley).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2.
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings).
Edited by William E. Murry and Peter F. Salisbury. New York, Plenum Press, 1964, p. 275–292. 5 refs. (See A65-81048).
Grant NsG-600.

Different units have been demonstrated which are small enough to fit in the eye, powerful enough to transmit from a freely swimming dolphin in ocean water, stable enough to transmit multiple information continuously for years after implanting, and suitable for tracking wild animals. Laboratory and field experiments can utilize passive and active transmitters. Among the units depicted and diagramatically described are the following: (1) a scanning grid-dip meter; (2) a frequency modulated pressure sensing transmitter; (3) a tonometer; (4) a motion transducer; (5) a stable low-current transmitter; (6) an impedance transducer; and (7) a blood pressure transducer.

A65-81058
MEASURING MOVEMENTS OF THE RETINAL IMAGE WITH RESPECT TO THE RETINA.
Tom N. Cornsweet (Calif. U., Berkeley).
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2.
(National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings).
Edited by William E. Murry and Peter F. Salisbury. New York, Plenum Press, 1964, p. 73–78. 13 refs. (See A65-81048).

Methods of recording eye movements, which involve the tracking or photographing of the front of the eye or of some object attached to the eye, are limited in their capacity to indicate the position of the retinal image with respect to the retina. Several methods are discussed which overcome the limitations by measuring directly the relative positions of the retinal image and the retina. The afterimage effect can be used to determine the time course of a saccadic eye movement by delivering a series of differently colored or otherwise coded flashes in rapid succession. Visual acuity deterioration permits the use of the symbol identification methods to determine an observer's line of sight. This method does not have a high precision and does not provide a continuous record of eye position but has an advantage because it requires no attachment to eye or camera and takes little time. The most precise continuous information about the location of the retinal image with respect to the retina can be gained by direct retinal tracking. The accuracy of tracking, however, depends upon several factors which may be difficult to control.

A65-81059
PERSONNEL TESTING.
Robert M. Guion (Bowling Green State U., Ohio).
New York, McGraw-Hill Co., 1965, xiii +585 p. refs. $9.50.

This is a textbook on personnel testing with emphasis on application of techniques and principles of testing to personnel selection and related

employment problems. Part 1– Foundations of Mental Measurements: personnel testing, measurement reliability, predictor variables, criterion measurement, test and test battery validation and use, and elements of test construction. Part 2–Instruments of Prediction: general measures of intellectual ability; measures of specific intellectual abilities, sensory and psychomotor abilities, and motivational variables; problems of personality measurement, and specially derived measures. Part 3–Application of Testing to Selection and Placement: selection of personnel in general, selection of managerial personnel, and administration of personnel testing program.

A65-81060
HUMAN FACTORS ENGINEERING.
Ernest J. McCormick (Purdue U., Occupational Res. Center, Lafayette, Ind.)
New York, McGraw-Hill Book Co., 1964, 2nd edition of Human Engineering, xii +653 p. 45 refs. $12.50.

This is a survey of human factors engineering with materials drawn from various disciplines relevant to human factors area. Part I: man–machine systems, and development and use of human factors information. Part II: sensory and motor processes. Part III: human information processes, information displays, speech communications, human motor activities, man–machine relationships, and controls and related devices. Part IV: work space and personnel equipment, and arrangement of elements and components. Part V: illumination, noise and vibration, atmospheric conditions, and man in motion. Part VI: human factors in system development, and simulation. The appendices include a list of abbreviations of organizations, a review of the processes of differentiation and integration, a brief evaluation and recommendations concerning certain types of control devices, and a list of selected references.

A65-81061
THE MEASUREMENT OF EYE MOVEMENT USING MAGNETIC INDUCTION IN A CONTACT LENS COIL.
D. A. Robinson (Johns Hopkins U., Baltimore, Md.)
IN: BIOMEDICAL SCIENCES INSTRUMENTATION, VOLUME 2. (National Biomedical Sciences Instrumentation Symposium, Second, Student Union, University of New Mexico, Albuquerque, May 4–6, 1964, Proceedings). Edited by William E. Murry and Peter F. Salisbury.
New York, Plenum Press, 1964, p. 97–106. 5 refs. (See A65-81048).
Grant PHS AM-05524.

Coils of fine wire embedded in a scleral contact lens have induced in them a voltage when the wearer of the lens is exposed to an alternating magnetic field. Two coils in spatial quadrature and two magnetic fields in spatial and phase quadrature are sufficient to generate voltages, which when amplified and phase detected yield three signals proportional to the horizontal, vertical, and torsional angles of eye position. Thus all three components of eye motion may be recorded simultaneously with an accuracy of 2% of full scale, a sensitivity of 15 seconds of arc, and a bandwidth of 1000 c/s. The use of a suction contact lens greatly reduces problems of slipping and offers a particularly convenient method of applying known forces and loads to the eye thus facilitating the study of the mechanics of human extraocular muscles and the dynamics of eye movement. Results of such a study show a marked similarity between saccadic eye movements and the step response of torque limited minimal time, switching control systems.

A65-81062
HUMAN RESPONSES TO SONIC BOOM.
Charles W. Nixon (Aerospace Med. Div., Aerospace Med. Res. Labs., Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 36, May 1965, p. 399–405. 8 refs.

Aircraft in supersonic flight generate pressure waves that are perceived along the ground as sonic booms. The impact of the sonic boom phenomenon upon humans has generated a great deal of concern and conjecture regarding individual responses and perceptions, group responses, and physiological responses. Data accumulated during the past several years by specific governmental and aviation agencies have provided some insight into the manner in which individuals and communities have responded to the sonic boom. This presentation summarizes these data in terms of the nature of human responses and the manner in which they occur, factors influencing acceptance of the boom, the possibility of physiological injury, psychological effects, and some reports of alleged minor damage to property and their relation to human reactions.

A65-81063
A NOVEL APPROACH TO MEASUREMENT OF MAN'S HEAT EXCHANGE WITH A COMPLEX RADIANT ENVIRONMENT.
A. P. Gage, J. A. J. Stolwijk, and J. D. Hardy (Yale U. School of Med., John B. Pierce Found. Lab. and Dept. of Physiol., New Haven, Conn.)
Aerospace Medicine, vol. 36, May 1965, p. 431–435. 6 refs. Am. Society of Heating, Refrigerating and Air-Conditioning Engr. supported research.
Grant NIH OH-00179-01.

Unclothed subjects in a sitting position were exposed to a variable source of thermal radiation (two 1500-watt quartz heaters). Ambient temperatures varied between 15° to 32° C; air movement (less than 7 cm/sec) and relative humidity (less than 30%) were constant for all experiments. Total heat loss by evaporation was evaluated from a continuous record of the subjects' weight loss while resting on a sensitive platform scale. Two series of experiments were performed: (1) the change in evaporative loss with increasing heater wattage was observed, while the ambient temperature (T_a) was constant in range 30° to 32° C and (2) the subject was allowed to choose the heater wattage necessary for sense of comfort and thermal neutrality, while the ambient temperature varied over range 15° to 30° C. From these two series, it can be shown: (a) a change in evaporative loss E corresponds to the radiant heat (H_r) absorbed by the body from the lamps: (b) the slope of the radiant heat (H_r) selected for comfort and neutrality when plotted against dropping ambient temperatures (T_a) is equal to the environmental constant, h. This constant describes how heat is lost by radiation plus convection from a skin surface at average temperature T_s to a uniform environment at temperature T_a. Thus it is possible, by using the human body as a radiometer (exp. 1) and as a null point sensor (exp. 2) of comfort-thermal neutrality, to describe quantitatively its heat exchange in a complex radiant environment and to evaluate the operative temperature (i.e., $T_a + H_r/h$).

A65-81064
VALIDITY OF FLIGHT BLOOD PRESSURE DATA.
James Roman, James P. Henry, and John P. Meehan (USAF School of Aerospace Med., Brooks AFB, Tex.)
Aerospace Medicine, vol. 36, May 1965, p. 436–441. 11 refs.

One test subject was instrumented for arterial blood pressure (arterial catheter) and acoustic blood pressure (Korotkoff method) while piloting an F-100 jet fighter aircraft. Purpose of the experiment was to rule out gross errors in interpretation of the data obtained by an automatic instrument designed for flight and based on the Korotkoff method. The experiment showed that the automatic acoustic blood pressure device was, in this instance, sufficiently accurate for any of the applications in which such information is used, either clinically or in monitoring flight crews. The mean absolute error for both systolic and diastolic pressure was well below the mean respiratory variation in arterial blood pressure.

A65-81065
EFFECT OF EXTREMITY CUFF-TOURNIQUETS ON TILT TABLE TOLERANCE AFTER WATER IMMERSION.
Fred B. Vogt (Tex. Inst. for Rehabil. and Res., Immobilization Study Unit, Houston).
Aerospace Medicine, vol. 36, May 1965, p. 442–447. 31 refs.
NASA supported research.

Tilt table intolerance of four healthy adult young males was studied in two water immersion experiments of six hours duration in an effort to reproduce a previous study reporting a protective effect from cuff tourniquets applied to the extremities during immersion. Body weight, fluid intake, urine output, and leg circumference measurements were made and recorded. After the first period of six hours of water immersion three of the four subjects experienced syncope during a tilt table test. Compared to preimmersion tilt tests all subjects experienced marked changes in heart rate or blood pressure during tilting after immersion. A significant diuresis was not noted. During the second period of immersion cuff tourniquets were applied to the four extremities and inflated to a pressure of 60 mm Hg, with a one-minute-on, and one-minute-off cycle. Some degree of protection against tilt table intolerance after immersion was provided in this test; none of the three subjects experienced syncope or showed the marked blood pressure changes they had shown on the previous immersion test without cuffs.

A65-81066
STUDY OF EFFECT OF WATER IMMERSION ON HEALTHY ADULT MALE SUBJECTS: PLASMA VOLUME AND FLUID-ELECTROLYTE CHANGES.
Fred B. Vogt and Philip C. Johnson (Tex. Inst. for Rehabil. and Res., Immobilization Study Unit; and Baylor U. Coll. of Med., Dept. of Rehabil. and Dept. of Med.; and Methodist Hosp., Houston, Tex.)
Aerospace Medicine, vol. 36, May 1965, p. 447–451. 27 refs.
NASA supported research.

Four healthy adult males were studied during two water immersion experiments of six hours duration. During the second experiment cuff-tourniquets were applied to all four extremities of each subject to test the effect in preventing or lessening the cardiovascular deconditioning associated with water immersion. The use of the cuff-tourniquets was found to be partially effective. Repeated plasma volume, hemoglobin, hematocrit and serum sodium, potassium, osmolarity, and protein determinations were performed and are reported. Fluid intake, urine output, and body weight measurements were made and are reported. An increased rate of transfer of intravascular protein as well as fluid and electrolytes into the extravascular compartment is suggested as one of the possible factors responsible for the symptoms observed during tilt table tests after water immersion.

A65-81067
RESISTANCE TO MOTION SICKNESS THROUGH REPEATED EXPOSURE TO CORIOLIS STIMULATION.
Patrick J. Dowd (Aerospace Med. Div., USAF School of Aerospace Med.,

Aeromed. Indoctrination Branch, Brooks AFB, Tex.)
Aerospace Medicine, vol. 36, May 1965, p. 452–455. 18 refs.

This report presents information of a method of repeated self-induced Coriolis stimulation, using four conditions: chair tilt, head movements in the lateral plane, head movements in both lateral and frontal planes, and head movements only in the frontal plane, on the SAM biaxial stimulator. The subject, Air Force Academy cadet, senior class, was evaluated for vestibular sensitivity after several incidents of motion sickness during flight training of the T-37 aircraft. Final testing after completion of this programed self-induced Coriolis stimulation indicated a resistance to motion sickness as determined from general autonomic reactions and data analysis of electronystagmograms. The subject has completed his solo flight training on the T-37 aircraft without any report of motion sickness.

A65-81068
EFFECT OF CHANGING RESULTANT LINEAR ACCELERATION RELATIVE TO THE SUBJECT ON NYSTAGMUS GENERATED BY ANGULAR ACCELERATION.
Martin P. Lansberg, Fred E. Guedry, Jr., and Ashton Graybiel (U.S. Naval School of Aviation Med., Pensacola, Fla.)
Aerospace Medicine, vol. 36, May 1965, p. 456–460. 27 refs. NASA supported research.

The effect of centripetal acceleration on nystagmus was studied by placing men at radii of 17 and 20 feet in various orientations relative to the center of rotation. Angular accelerations and decelerations were approximately 10 deg/sec^2. In some of these different positions the planes of the semicircular canals remained unchanged relative to the plane of rotation but the orientation of the resultant force relative to the otolith system was changed. In several such situations the magnitude, plane, and direction of nystagmus were changed by centripetal accelerations between 1 and 2 g units. Results are discussed in terms of otolith modulation of sensory input from the semicircular canals.

A65-81069
DISTURBANCE OF OCULOMOTOR CONTROL IN FLIGHT.
G. Melvill Jones (McGill U., Dept. of Physiol., Montreal, Canada).
(XIIIth Internat. Congress of Aviation and Space Med., Dublin, Ireland, Sept. 1964).
Aerospace Medicine, vol. 36, May 1965, p. 461–465. 13 refs.

An overall analysis of the physiological processes contributing to stabilization of the retinal image reveals four main sensory and three main motor information channels. The three motor outputs operate on three discrete anatomical platforms described as the eye-in-skull, the skull-on-body, and the body-in-space. Probably all of these are used in everyday life, although apparently different species of animals preferentially employ different platforms. Detailed consideration of the visual tracking and vestibulo-ocular mechanisms disclose a number of limitations imposed on the overall system by the flight environment. Specifically, those here considered are the limited frequency response of visual tracking, virtual absence of visual tracking in the roll plane, the vestibular errors introduced by prolonged turning, and the predominance of an anticompensatory vestibulo-ocular response during rapid head rotation.

A65-81070
OXYGEN CONSUMPTION DURING FLIGHT AT MODERATE G.
F. Vogt Lorentzen (Inst. of Aviation Med., Oslo, Norway).
Aerospace Medicine, vol. 36, May 1965, p. 415–417. 5 refs.

The oxygen consumption during a strenuous flying program lasting for 6 to 8 minutes corresponded to about, or somewhat higher than, 300 kg/min. The uptake was down to almost resting levels 1 to 2 minutes after the g load, which might seem to be in contradiction to some other investigations. The difference may be explained by difference in duration and size of g and by the different methods used.

A65-81071
DISSOLVED NITROGEN AND BENDS IN OXYGEN-NITROGEN MIXTURES DURING EXERCISE AT DECREASED PRESSURES.
Eugene A. Degner, Kenneth G. Ikels, and Thomas H. Allen (Aerospace Med. Div., USAF School of Aerospace Med., Physiol. Branch, Brooks AFB, Tex.)
Aerospace Medicine, vol. 36, May 1965, p. 418–425. 29 refs.

Four types of simulated orbiting laboratory flights of 10 to 21 hours' duration, involving 107 man-flights and 93 analyses of N_2 dissolved in blood, were performed for the purpose of ascertaining the average intensity and duration of bends pains. Generally bends occurred most often during transfer and reconnaissance. Once bends appeared, it reoccurred in subsequent flight stages. This can be avoided by sufficient breathing of O_2 such that blood N_2 falls to levels insufficient, theoretically, to provide enough N_2 molecules to form seed bubbles. On this basis it can be predicted that missions in a pure O_2 environment require 120 minutes of O_2 breathing at 14.5 psia before decompression to 5 psia and an additional 375 minutes before a second decompression to 3.5 psia. At that time one could return to 5 psia O_2 or preferably to 46:50::O_2:N_2 at 7 psia; the latter takes 33 minutes of O_2 breathing before reconnoitering at 3.5 psia. If pressure suits and locks operated successfully at 5 instead of 3.5 psia, O_2 breathing time could be saved and danger of bends avoided.

A65-81072
EFFECTS OF VARIABLE DECOMPRESSIONS TO 45,000 FEET.
Charles I. Barron and Thomas J. Cook.
(Airlines Med. Direct. Assoc. Meeting, Miami Beach, Fla., May 9, 1964).
Aerospace Medicine, vol. 36, May 1965, p. 425–430. 7 refs.
Contract FAA-FA-3082.

Tests were conducted to determine the effects of decompression from 8,000 to 45,000 feet at rates of 5 to 38 seconds on 4 civilian test pilots and 4 passenger subjects. Masks of several types currently in use in transport and business aircraft were worn or donned at varying intervals of exposure. Physiological measurements and cellular enzyme determinations were recorded in all tests, and performance and communication studies were conducted on the pilots. Results of the tests revealed inability of subjects to complete all pretest instructions. Extreme reactions of varying degree occurred in the three subjects exposed to the five-second decompressions. Jerking movements occurred in two of the subjects who did not apply their masks for periods of five to six seconds after reaching maximum altitude. Encephalographic changes, indicative of severe hypoxia, occurred in these cases between 16 and 40 seconds after the start of decompression without wearing a mask; however, enzyme changes were nonsignificant. The passengers had difficulty in applying the mask properly. The study confirmed the findings of other investigators in noting that unless 100% oxygen was inspired within 5 to 7 seconds after exposure to 45,000 feet, unconsciousness would occur at 13 to 16 seconds. The test emphasized the necessity for wearing an oxygen mask during all rapid decompressions to 45,000 feet and the desirability of improvement in oxygen dispensing for passengers.

A65-81073
EVALUATION OF AN ALLEGED CASE OF RADIATION INDUCED CATARACT AT A RADAR SITE.
John D. Dougherty, William M. Howe (FAA, Fort Worth, Tex.), Joseph C. Caldwell (FAA, Washington, D.C.), and William B. Clark (School of Aerospace Med., Ophthalmol. Dept., Brooks AFB, Tex.)
Aerospace Medicine, vol. 36, May 1965, p. 466–471. 6 refs.

The use of radar is becoming more commonplace throughout the world. Attendant to its use is injury from microwave and ionizing radiation. Evaluation of radar sites for radiation hazards requires special instrumentation, practice, and experience. Stray RF energy and high heat levels were noted to give erroneous values to survey teams. Types of equipment and the methods used are explained. In this case a radiation induced cataract was claimed but not found. However, there was every opportunity at first glance for the employee to be convinced that his cataract was radiation induced. The need for knowledgeable, prompt, medical support in evaluating suspected injuries was emphasized by its absence early in the case history. However, the most important asset to employee morale and efficiency was found to be the high degree of understanding and general educational background of the technicians. As the use of radar spreads to areas with lower educational levels the importance of such training should increase.

A65-81074
SHIFTS IN AIR-CONDUCTION THRESHOLDS PRODUCED BY PULSED AND CONTINUOUS CONTRALATERAL MASKING.
Donald D. Dirsk and Carolyn Malmquist (Calif. U., Center for the Health Sci., Los Angeles).
Journal of the Acoustical Society of America, vol. 37, Apr. 1965, p. 631–637. 11 refs.
Natl. Inst. of Neurological Diseases and Blindness supported research.

In the present investigations, auditory threshold shifts for either constant or pulsed pure tones were observed while a steady or pulsed narrow band of white noise was delivered to the contralateral ear via an insert receiver. The narrow-band masker, centered around 4000 cps, was presented at intensity levels of 50, 70, and 90 dB SPL while thresholds were obtained from the test ear at 4000, 1000, and 250 cps. The results demonstrate, first, that larger threshold shifts occur when the test signal and the masker are pulsed simultaneously than when the masker is continuous; second, that a continuous masker may be as effective as the pulsed masker if the test tone is also continuous; third, that more contralateral masking is found when the test tone and masker are closed in frequency; and last, that a small increase in the average threshold shift occurs as the intensity level of the masker increases. Several interpretations are offered in explanation of the threshold shifts for the continuous-continuous and pulsed-pulsed (simultaneous) conditions.

A65-81075
USE OF NOISE TO ELIMINATE ONE EAR FROM MASKING EXPERIMENTS.
Peter B. Weston and James D. Miller (Central Inst. for the Deaf, St. Louis, Mo.)
Journal of the Acoustical Society of America, vol. 37, Apr. 1965, p. 638–646. 14 refs.
PHS supported research.

To evaluate the possibility that one ear can be eliminated from a masking experiment by use of noise, certain relevant facts were determined. These are: (1) if a tonal signal mixed with noise is received at one ear, the addition of a noise to the other ear slightly reduces the threshold for the tone if the noises are statistically independent; (2) in contrast, the noise added to the nonsignal ear distinctly reduces the threshold for the tone if the noises are perfectly correlation (+1.0); (3) these effects, (1) and (2) above, are observed whether the level of the added noise at the ear that does not receive the tonal signal is less than, equal to, or greater than the level of the added noise at the ear; and (4) if identical tones are presented to the two ears and if the signal-to-noise ratio is about 25 dB lower in one ear than in the other, the effect of the signal at the ear with the lower signal-to-noise ratio is eliminated from the masking experiment.

A65-81076
DISTORTION PROCESSES IN THE COCHLEAR-MICROPHONIC RESPONSE UNDER NORMAL AND ABNORMAL PHYSIOLOGICAL CONDITIONS.
David Wolsk (Mich. U., Kresge Hearing Res. Inst., Ann Arbor).
Journal of the Acoustical Society of America, vol. 37, Apr. 1965, p. 647-652. 10 refs.
U.S. Dept. of Army supported research.

There is a long history of controversy concerning the locus and mechanism of harmonic-distortion processes in the cochlea. This controversy has importance for theories of frequency analysis along the basilar membrane and concepts of the transduction process in the hair cells, as well as for the clinical significance of psychophysical tests of aural harmonics. The cochlear-microphonic response to a pure tone recorded at the round window of the guinea pig was led into three wave analyzers tuned to the 1st-, 2nd-, and 3rd-harmonic frequencies, each component then driving one channel of a penrecorder. The various components exhibit shifts through time, which were studied at various frequencies and intensities, and during recovery from fatiguing and damaging levels of tonal and random-noise stimulation and anoxia. The data are discussed in terms of mechanical versus transduction concepts of harmonic distortion in the cochlea.

A65-81077
TEMPORAL EFFECTS IN SIMULTANEOUS MASKING BY WHITE-NOISE BURSTS.
Eberhard Zwicker (Bell Telephone Labs., Inc., Murray Hill, N. J.)
Journal of the Acoustical Society of America, vol. 37, Apr. 1965, p. 653-663. 17 refs.

The motivation of the research described was to investigate the behavior of a masking transient that indicates that masking of a short signal pulse by a longer white-noise burst is stronger at the beginning of the masker burst than later. The threshold of signal pulses masked by masker bursts was measured as a function of different variables such as bandwidth and center frequency of the signal, delay between onset of masker and onset of signal, duration of signal and masker, level of masker, and repetition rate. The results reveal very little "overshoot" of the threshold of short pulses as a function of the on time of the masker if the signal and the masker have the same or similar broad spectra. The overshoot increases up to 13 dB as the bandwidth of the signal decreases down to that of a tone. The size of the "overshoot" and the prior excitation seem to be related to each other. Taking this in account, the thresholds under different conditions can be calculated on the basis of detection models. The measured and the calculated values are in good agreement.

A65-81078
ON THE DEVELOPMENT OF GAS BUBBLES IN THE BLOOD UPON RAPID DECOMPRESSION [OVER HET ONTSTAAN VAN GASBELLEN IN HET BLOED DOOR SNELLE LUCHTDRUKDALING].
H. Leeuwe (Stichting Natl. Luchtvaartgeneeskundig Centrum, The Netherlands)
Nederlands Militair Geneeskundig Tijdschrift, vol. 18, 1965, p. 9-16. In Dutch.

Mice, unadapted to low pressures, were explosively decompressed from sea level to a simulated altitude of 12 km within 6 to 8 sec. At that altitude the animals died within 15 to 20 sec. When the air pressure was increased at once, a great part survived but succumbed eventually after 15 to 90 min. Microscopic examinations of frozen brain sections of the unrecompressed animals revealed spheric gas bubbles having a diameter of 2 to 3μ and consisting primarily of nitrogen. It may be assumed that due to their minute size these bubbles do not interfere with capillary circulation and that therefore death immediately after rapid explosive decompression is not caused by air embolism. In the animals that were recompressed and survived for a longer time, the bubbles were found to be of greater size (50μ to 100μ) which had led to death due to embolism in the heart capillaries. Theoretical considerations on the genesis of gas bubbles in capillaries lead to the conclusion that time is required for the bubbles to acquire critical size. It is surmized that a mechanism could be developed by which it would be possible for the organism to eliminate the small, harmless bubbles before they acquire a size that causes fatal air embolism.

A65-81079
PERCEPTION OF CONTOURS IN THE CENTRAL FOVEA.
D. P. Andrews (Keele U., Dept of Commun., Staffordshire, Great Britain).
Nature, vol. 205, Mar. 20, 1965, p. 1218-1220. 8 refs.

The presence of filter units (FF) in the human visual cortex, which respond selectively to the orientation of lines is inferred from a series of psychophysical experiments. The following hypotheses are proposed on the properties of FF: (1) each FF responds to a range of presentation orientations, (2) FF vary in selectivity, (3) most FF receive inputs from both eyes, (4) integration of FF responses is achieved by mutual inhibition, and (5) inhibition between FF is subject to adaptation. Supporting data are cited.

A65-81080
CEREBRAL EFFECTS OF HYPERVENTILATION IN MAN.
Fumio Gotoh, John S. Meyer (Wayne State U., Detroit Receiving Hosp., Depts. of Neurol.; and Wayne Center for Cerebrovascular Res., Detroit, Mich.), and Yasuyuki Takagi (Keio U., Dept. of Internal Med., Tokyo, Japan).
(Am. Neurol. Assoc., 89th Ann. Meeting, Atlantic City, N. J., 1964).
Archives of Neurology, vol. 12, Apr. 1965, p. 410-423. 42 refs.
PHS and Receiving Hosp. Res. Corp., supported research.

Continuous measurements were made of gases and electrolytes in arterial and jugular blood while recording the electroencephalogram (EEG) during hyperventilation of 18 volunteers between the ages of 13 and 66 years. Reduction of cerebral venous oxygen tension (JP_{O_2} showed close correlation with the appearance of EEG slowing during hyperventilation. Of the total decrease of JP_{O_2}, 73% was due to reduction of cerebral blood flow, and 27% was attributable to the Bohr effect. The reduction of JP_{O_2} in the younger age group (below 35 years) was significantly larger than that of the older group (above 36 years of age). Internal jugular venous sodium ions decreased and potassium ions increased during hyperventilation; similar changes occurred in arterial blood. It is determined that EEG slowing induced by hyperventilation is the result of cerebral hypoxia caused by the constriction of cerebral vessels which in turn results from reduction in arterial carbon dioxide tension. The alkalosis of hyperventilation also increases cerebral hypoxia by the Bohr effect.

A65-81081
AN EXPLANATION OF MENTAL SYMPTOMS FOUND IN ACUTE SENSORY DEPRIVATION: RESEARCHES 1958-1963.
Eugene Ziskind (Southern Calif. U., School of Med., Los Angeles).
(American Psychiatric Association, 120th Annual Meeting, Los Angeles, Calif., May 4-8, 1964).
American Journal of Psychiatry, vol. 121, Apr. 1965, p. 939-946. 27 refs.

In order to determine the cause of abnormal behavior and mental symptoms formerly attributed to sensory deprivation, research was carried out on binocularly patched patients after cataract extraction or retinal detachment and on normal controls. It is concluded that hallucinations and other disturbances in cognitive functions may be interpreted as symptoms common to periods of reduced awareness. The aberrations may be increased and prolonged by sensory deprivation and further augmented and highlighted by experimental directions and goal orientation in life situations. These findings indicate that in special situations, such as in space travel, the symptoms may be prevented by: (1) seting up two-man teams; (2) counteracting boredom and fatigue by intensification of stimuli of several senses; (3) telemetric monitoring of the electroencephalogram to precipitate arousal; and (4) mechanized control of flight.

A65-81082
THE THERMOSTAT IN MAN. II. [DER THERMOSTAT IM MENSCHEN. II.]
Theodor Benzinger.
Bild der Wissenschaft, vol. 2, Mar. 1965, p. 232-240. In German.

Recent data on the mechanisms responsible for temperature constancy of the human being are reviewed. The center for heat regulation located in the anterior hypothalamus functions as a thermal sensor for heat. Cold stimuli are transmitted from cold receptors in the skin over the spinothalamic tracts to the cold protection center (Krehl-Isenschmidt) in the posterior hypothalmamus. This center sends out impulses to muscles for shivering response and increase of heat production. Isolated warming of the cold center failed to stop the shiver, which indicates that this center is not a temperature sensor. Shivering stops, however, upon warming the center of the anterior hypothalamus. The human thermostat starts to operate as soon as the internal temperature exceeds 37.15° C with a signal to start heat dissipation by sweating. A fall of the internal temperature below 37.15° C invokes cold defenses primarily in form of shiver and secondarily through conscious behavioral avoidance reactions. In contrast to the heat loss mechanism, shivering may start upon the initial cold sensation on the skin before a fall of the internal temperature.

A65-81083
LEADERSHIP— A NEW MODEL.
Fred E. Fiedler.
Discovery, vol. 26, Apr. 1965, p. 12-17.

A new model for effective leadership is developed in view of the conflicting results from studies on the classical directive or autocratic type leadership versus the nondirective or democratic type leadership. A research program involving the leadership classification test (LPC) which requires rating of the least preferred coworker brought out the major factors which affect the effectiveness of the nondirective leader with high LPC score as well as that of the directive leader with the low LPC score. There are classified into: (1) leader-member relations, (2) task structure, and (3) leader's power of position. The permissive, human relations approach worked best with: (a) a group engaged in a highly unstructured task, and (b) where a not-too-well accepted leader has a structured job. In certain organizations, as the work progresses the situation becomes more structured and calls for a change in the type of leadership, which may be handled best by bringing in another leader. A contingency model based on these hypotheses was tested with multilingual military groups of the Belgian Navy. Its basic limitation is that it is applicable only to interacting groups in which the task requires close cooperation among group members.

A65-81084
THE KININ CONTENT OF HUMAN BLOOD AT REST AND DURING VASODILATION.
O. Carretero, A. Nasjletti, and J. C. Fasciolo (U. Nacional de Cuyo, Fac. de Cienc. Med., Dept. of Physiol., Mendoza, Argentina).
Experientia, vol. 21, Mar. 15, 1965, p. 141–142. 13 refs.

Kinins are found in circulating arterial and venous human blood at a level of 1 unit/100 ml of blood (0.1 microgram of bradykinin). Venous blood of the elbow remains at the same level during thermal vasodilation (by immersion of the arm in warm water) and during the performance of muscular work on a Mosso ergograph.

A65-81085
THE EFFECT OF SEVERE HYPOXIC HYPOXIA IN THE DECOMPRESSION CHAMBER ON THE CATECHOLAMINE CONTENT OF THE HYPOTHALAMUS IN THE CAT.
R. Debijadji, V. Varagic, N. Dekleva, S. Eicic, M. Stefanovic, J. Davidovic, and T. Marisavljevic (Inst. of Aviation Med., Zemun, Yugoslavia).
Experientia, vol. 21, Mar. 15, 1965, p. 153.

Cats were kept for 1 hour at a simulated altitude of 10,000 to 10,500 meters (approximately 33,000 feet) in the decompression chamber. The animals were recompressed for one minute, and the catecholamines were extracted from the hypothalamic tissue. The extract was estimated both fluorimetrically and biologically on the rat's blood pressure. The hypothalamic catecholamines were significantly reduced in the animals exposed to the hypoxic hypoxia.

A65-81086
NYSTAGMUS EVOKED BY INTERMITTENT PHOTIC STIMULATION OF THE RABBIT'S EYE.
A. Costin, M. Chaimovitz, and F. Bergmann (Hebrew U., Hadassah Med School, Dept. of Pharmacol., Jerusalem, Israel).
Experientia, vol. 21, Mar. 15, 1965, p. 167–168. 6 refs.
Joseph Porton Trust supported research.

Intermittent photic stimulation of a rabbit's eye has shown that flash nystagmus can be elicited by monocular flashing if the contralateral eye is protected from light. Flash nystagmus has several properties in common with central nystagmus: (1) direction of response; (2) photic inhibition by stationary illumination of the other eye; and (3) biphasic effect of chlorpromazine. Flash nystagmus, however, differs from central nystagmus in the limited frequency range of stimulation and in the position of the optimum. Quantitative differences are also apparent. The optokinetic stimulus is more effective: all animals showed a positive response, which was more intense than flash nystagmus.

A65-81087
AVIATION NOISE: MEASUREMENT WITH SPORT AIRCRAFT AND HYGIENIC ASPECTS [FLUGLARM MESSUNGEN AN SPORTFLUGZEUGEN UND HYGIENISCHE ASPEKTE].
H. G. Demus and W. Lorenz (Martin-Luther-U., Universitätsklin. und Poliklin. für Hals-, Nasen- und Ohrenkrankheiten, Halle, East Germany).
Zeitschrift für die gesamte Hygiene und ihre Grenzgebiete, vol. 11, Jan. 1965, p. 1–25. 45 refs. In German.

Noise stresses and injuries due to aviation are observed to an ever increasing extent. A number of articles investigating the effect of noise on the autonomic nervous, sensory, sleep, and cardiovascular functions are summarized. After a theoretical explanation of the special problems arising in connection with aviation noise measurement, the author presents results from comprehensive noise measurements during engine warmup, landing, and overflights at specified altitudes carried out with seven types of sports aircraft currently flying in the German Democratic Republic. It can be seen readily that private aircraft during certain flying conditions and low flight altitudes contribute extensively to the ground noise level in addition to noise from military and commercial aircraft. Graphs of sound pressure level and frequency spectra are presented. Prophylactic measures are suggested.

A65-81088
OBJECT RECOGNITION AS A FUNCTION OF NUMBER OF DIFFERENT VIEWS DURING TRAINING.
Sidney S. Culbert (Wash. U., Seattle).
Perceptual and Motor Skills, vol. 20, Apr. 1965, p. 491–492.

Groups of subjects, in a training session, were presented 768 views of a novel polyhedron, other views of which they would later be required to recognize. A number of different views in the training series, from 12 to 768, made no difference in performance.

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